

# CPC COOPERATIVE PATENT CLASSIFICATION

## H ELECTRICITY

(NOTE omitted)

## H04 ELECTRIC COMMUNICATION TECHNIQUE

(NOTE omitted)

## H04L TRANSMISSION OF DIGITAL INFORMATION, e.g. TELEGRAPHIC COMMUNICATION (arrangements common to telegraphic and telephonic communication H04M)

### NOTES

1. This subclass covers transmission of signals having been supplied in digital form and includes data transmission, telegraphic communication, or methods or arrangements for monitoring.
2. In this subclass, it is desirable to add the indexing codes of group [H04L 2101/00](#).

### WARNINGS

1. The following IPC groups are not in the CPC scheme. The subject matter for these IPC groups is classified in the following CPC groups:

<a href="#">H04L 9/18</a>	covered by	<a href="#">H04L 9/065</a>
<a href="#">H04L 9/20</a>	covered by	<a href="#">H04L 9/0656</a>
<a href="#">H04L 9/22</a>	covered by	<a href="#">H04L 9/0662</a>
<a href="#">H04L 9/24</a>	covered by	<a href="#">H04L 9/0662</a>
<a href="#">H04L 9/26</a>	covered by	<a href="#">H04L 9/0668</a>
<a href="#">H04L 9/28</a>	covered by	<a href="#">H04L 9/002</a> , <a href="#">H04L 9/008</a> , <a href="#">H04L 9/06</a> , <a href="#">H04L 9/08</a> , <a href="#">H04L 9/30</a> , <a href="#">H04L 9/32</a>
<a href="#">H04L 12/20</a>	covered by	<a href="#">H04L 69/00</a>
<a href="#">H04L 25/04</a>	covered by	<a href="#">H04L 25/03</a>
<a href="#">H04L 25/17</a>	covered by	<a href="#">H04L 25/02</a> - <a href="#">H04L 25/0298</a>
<a href="#">H04L 25/18</a>	covered by	<a href="#">H04L 25/027</a>
<a href="#">H04L 25/28</a>	covered by	<a href="#">H04L 25/0268</a>
<a href="#">H04L 25/30</a>	covered by	<a href="#">H04L 25/061</a>
<a href="#">H04L 25/32</a>	covered by	<a href="#">H04L 25/49</a>
<a href="#">H04L 25/34</a>	covered by	<a href="#">H04L 25/4917</a>
<a href="#">H04L 25/48</a>	covered by	<a href="#">H04L 25/49</a>
<a href="#">H04L 25/52</a>	covered by	<a href="#">H04L 25/20</a>
<a href="#">H04L 25/54</a>	covered by	<a href="#">H04L 25/20</a>
<a href="#">H04L 25/56</a>	covered by	<a href="#">H04L 25/202</a>
<a href="#">H04L 25/58</a>	covered by	<a href="#">H04L 25/20</a>
<a href="#">H04L 25/60</a>	covered by	<a href="#">H04L 25/207</a>
<a href="#">H04L 25/62</a>	covered by	<a href="#">H04L 25/205</a>
<a href="#">H04L 25/64</a>	covered by	<a href="#">H04L 25/245</a>
<a href="#">H04L 25/66</a>	covered by	<a href="#">H04L 25/247</a>

2. In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.

<b>1/00</b>	<b>Arrangements for detecting or preventing errors in the information received {(correcting synchronisation <a href="#">H04L 7/00</a>)}</b>	1/0007	. . . {by modifying the frame length}
		1/0008	. . . . {by supplementing frame payload, e.g. with padding bits}
1/0001	. {Systems modifying transmission characteristics according to link quality, e.g. power backoff (adaptive data allocation for multicarrier modulation <a href="#">H04L 5/0044</a> ; controlling transmission power for radio systems <a href="#">H04W 52/04</a> )}	1/0009	. . {by adapting the channel coding ( <a href="#">H04L 1/1812</a> takes precedence)}
1/0002	. . {by adapting the transmission rate}	1/001	. . . {applied to control information}
1/0003	. . . {by switching between different modulation schemes}	1/0011	. . . {applied to payload information}
1/0004	. . . . {applied to control information}	1/0013	. . . {Rate matching, e.g. puncturing or repetition of code symbols}
1/0005	. . . . {applied to payload information}	1/0014	. . {by adapting the source coding}
1/0006	. . {by adapting the transmission format}	1/0015	. . {characterised by the adaptation strategy}
		1/0016	. . . {involving special memory structures, e.g. look-up tables}

- 1/0017 . . . {where the mode-switching is based on Quality of Service requirement}
- 1/0018 . . . . {based on latency requirement}
- 1/0019 . . . {in which mode-switching is based on a statistical approach}
- 1/002 . . . . {Algorithms with memory of the previous states, e.g. Markovian models}
- 1/0021 . . . . {in which the algorithm uses adaptive thresholds}
- 1/0022 . . . {in which mode-switching is influenced by the user}
- 1/0023 . . {characterised by the signalling}
- 1/0025 . . . {Transmission of mode-switching indication}
- 1/0026 . . . {Transmission of channel quality indication}
- 1/0027 . . . {Scheduling of signalling, e.g. occurrence thereof}
- 1/0028 . . . {Formatting}
- 1/0029 . . . . {Reduction of the amount of signalling, e.g. retention of useful signalling or differential signalling ([power control H04W 52/04](#))}
- 1/003 . . . . {Adaptive formatting arrangements particular to signalling, e.g. variable amount of bits}
- 1/0031 . . . . {Multiple signaling transmission ([H04L 1/1664](#), [F15](#) take precedence)}
- 1/0032 . . . {Without explicit signalling}
- 1/0033 . . {arrangements specific to the transmitter}
- 1/0034 . . . {where the transmitter decides based on inferences, e.g. use of implicit signalling}
- 1/0035 . . . {evaluation of received explicit signalling}
- 1/0036 . . {arrangements specific to the receiver}
- 1/0038 . . . {Blind format detection ([for detection of modulation format H04L 27/0012](#))}
- 1/0039 . . . {other detection of signalling, e.g. detection of TFCI explicit signalling ([H04L 1/0046](#), [H04L 27/0012](#) and [H04L 25/0262](#) take precedence)}
- 1/004 . . {by using forward error control ([H04L 1/0618](#) takes precedence; coding, decoding or code conversion, [for error detection or correction H03M 13/00](#))}
- 1/0041 . . {Arrangements at the transmitter end}
- 1/0042 . . . {Encoding specially adapted to other signal generation operation, e.g. in order to reduce transmit distortions, jitter, or to improve signal shape ([H04L 1/0067](#) takes precedence)}
- 1/0043 . . . {Realisations of complexity reduction techniques, e.g. use of look-up tables}
- 1/0044 . . . . {specially adapted for power saving}
- 1/0045 . . {Arrangements at the receiver end}
- 1/0046 . . . {Code rate detection or code type detection ([H04L 1/0038](#) takes precedence; detection of the data rate [H04L 25/0262](#); for packet format [H04L 1/0091](#))}
- 1/0047 . . . {Decoding adapted to other signal detection operation ([in conjunction with sequence estimation or equalization H04L 25/03286](#))}
- 1/0048 . . . . {in conjunction with detection of multiuser or interfering signals, e.g. iteration between CDMA or MIMO detector and FEC decoder ([for spatial equalizer H04L 25/03286](#))}
- 1/005 . . . . {Iterative decoding, including iteration between signal detection and decoding operation}
- 1/0051 . . . . . {Stopping criteria}
- 1/0052 . . . {Realisations of complexity reduction techniques, e.g. pipelining or use of look-up tables}
- 1/0053 . . . . {specially adapted for power saving}
- 1/0054 . . . {Maximum-likelihood or sequential decoding, e.g. Viterbi, Fano, ZJ algorithms}
- 1/0055 . . . {MAP-decoding}
- 1/0056 . . {Systems characterized by the type of code used ([H04L 1/08](#) takes precedence)}
- 1/0057 . . . {Block codes ([H04L 1/0061](#), [H04L 1/0064](#) take precedence)}
- 1/0058 . . . . {Block-coded modulation}
- 1/0059 . . . {Convolutional codes}
- 1/006 . . . . {Trellis-coded modulation}
- 1/0061 . . . {Error detection codes}
- 1/0063 . . . . {Single parity check}
- 1/0064 . . . {Concatenated codes}
- 1/0065 . . . . {Serial concatenated codes}
- 1/0066 . . . . {Parallel concatenated codes}
- 1/0067 . . . {Rate matching ([H04L 1/0013](#) and [H04L 1/08](#) take precedence)}
- 1/0068 . . . . {by puncturing}
- 1/0069 . . . . . {Puncturing patterns}
- 1/007 . . . {Unequal error protection ([for format H04L 1/0078](#); [for codes per se H03M 13/35](#))}
- 1/0071 . . . {Use of interleaving ([interleaving per se H03M 13/27](#))}
- 1/0072 . . {Error control for data other than payload data, e.g. control data}
- 1/0073 . . . {Special arrangements for feedback channel}
- 1/0075 . . {Transmission of coding parameters to receiver ([H04L 1/0023](#) takes precedence)}
- 1/0076 . . {Distributed coding, e.g. network coding, involving channel coding ([coding in both space and time H04L 1/0618](#); [cooperative diversity H04B 7/022](#))}
- 1/0077 . . . {Cooperative coding}
- 1/0078 . . {Avoidance of errors by organising the transmitted data in a format specifically designed to deal with errors, e.g. location ([forward error control, e.g. FEC, CRC H04L 1/004](#); [adaptive formatting H04L 1/0006](#); [mappings H04L 27/00](#))}
- 1/0079 . . {Formats for control data ([H04L 1/16](#) takes precedence; [training sequences H04L 25/00](#) and [H04L 27/00](#))}
- 1/008 . . . {where the control data relates to payload of a different packet}
- 1/0081 . . . {Formats specially adapted to avoid errors in the feedback channel ([H04L 1/1607](#) takes precedence)}
- 1/0082 . . . {fields explicitly indicating existence of error in data being transmitted, e.g. so that downstream stations can avoid decoding erroneous packet; relays}
- 1/0083 . . {Formatting with frames or packets; Protocol or part of protocol for error control}
- 1/0084 . . {Formats for payload data}
- 1/0085 . . {Formatting with cells}
- 1/0086 . . {Unequal error protection ([H04L 27/00](#) and [H04L 1/004](#) take precedence for layer 1/2 aspects, e.g. bit loading)}
- 1/0088 . . . {in control part}
- 1/0089 . . . {in payload}
- 1/009 . . {arrangements specific to transmitters}

1/0091	. . {arrangements specific to receivers, e.g. format detection (detection of data rate <a href="#">H04L 25/0262</a> ; detection of coding rate <a href="#">H04L 1/0046</a> )}	1/1671	. . . . {the supervisory signal being transmitted together with control information}
2001/0092	. {Error control systems characterised by the topology of the transmission link}	1/1678	. . . . {where the control information is for timing, e.g. time stamps}
2001/0093	. . {Point-to-multipoint}	1/1685	. . . . {the supervisory signal being transmitted in response to a specific request, e.g. to a polling signal}
2001/0094	. . {Bus}	1/1692	. . . . {Physical properties of the supervisory signal, e.g. acknowledgement by energy bursts}
2001/0095	. . {Ring}	1/18	. . . Automatic repetition systems, e.g. Van Duuren systems
2001/0096	. . {Channel splitting in point-to-point links}	1/1803	. . . . Stop-and-wait protocols
2001/0097	. . {Relays}	1/1806	. . . . Go-back-N protocols
2001/0098	. {Unequal error protection}	1/1809	. . . . Selective-repeat protocols
1/02	. by diversity reception	1/1812	. . . . Hybrid protocols; Hybrid automatic repeat request [HARQ]
1/04	. . using frequency diversity	1/1816	. . . . {with retransmission of the same, encoded, message}
1/06	. . using space diversity	1/1819	. . . . {with retransmission of additional or different redundancy}
1/0606	. . . {Space-frequency coding}	1/1822	. . . . involving configuration of automatic repeat request [ARQ] with parallel processes
1/0612	. . . {Space-time modulation}	1/1825	. . . . Adaptation of specific ARQ protocol parameters according to transmission conditions
1/0618	. . . {Space-time coding}	1/1829	. . . . Arrangements specially adapted for the receiver end
1/0625	. . . . {Transmitter arrangements}	1/1832	. . . . {Details of sliding window management}
1/0631	. . . . {Receiver arrangements}	1/1835	. . . . {Buffer management}
1/0637	. . . . {Properties of the code}	1/1838	. . . . {for semi-reliable protocols, e.g. for less sensitive applications such as streaming video (buffer level management for video bitstream receiver <a href="#">H04N 21/44004</a> )}
1/0643	. . . . {block codes}	1/1841	. . . . {Resequencing}
1/065	. . . . {by means of convolutional encoding}	1/1845	. . . . {Combining techniques, e.g. code combining}
1/0656	. . . . {Cyclotomic systems, e.g. Bell Labs Layered Space-Time [BLAST]}	1/1848	. . . . {Time-out mechanisms}
1/0662	. . . . {Limited orthogonality systems}	1/1851	. . . . {using multiple timers}
1/0668	. . . . {Orthogonal systems, e.g. using Alamouti codes}	1/1854	. . . . {Scheduling and prioritising arrangements}
1/0675	. . . . {characterised by the signaling}	1/1858	. . . . {Transmission or retransmission of more than one copy of acknowledgement message}
1/0681	. . . . {adapting space time parameters, i.e. modifying the space time matrix}	1/1861	. . . . {Physical mapping arrangements (for ACK signaling see also <a href="#">H04L 5/0053</a> )}
1/0687	. . . . {Full feedback}	1/1864	. . . . {ARQ related signaling ( <a href="#">H04L 1/1607</a> takes precedence)}
1/0693	. . . . {Partial feedback, e.g. partial channel state information [CSI]}	1/1867	. . . . Arrangements specially adapted for the transmitter end
1/08	. by repeating transmission, e.g. Verdan system ( <a href="#">H04L 1/1858</a> and <a href="#">H04L 1/189</a> take precedence)	1/187	. . . . {Details of sliding window management}
1/12	. by using return channel	1/1874	. . . . {Buffer management}
2001/125	. . {Arrangements for preventing errors in the return channel}	1/1877	. . . . {for semi-reliable protocols, e.g. for less sensitive applications like streaming video (buffer level management for video bitstream control arrangements <a href="#">H04N 21/44004</a> )}
1/14	. . in which the signals are sent back to the transmitter to be checked (; echo systems)	1/188	. . . . {Time-out mechanisms}
1/16	. . in which the return channel carries supervisory signals, e.g. repetition request signals	1/1883	. . . . {using multiple timers}
1/1607	. . . Details of the supervisory signal	1/1887	. . . . {Scheduling and prioritising arrangements}
1/1614	. . . . {using bitmaps}	1/189	. . . . {Transmission or retransmission of more than one copy of a message}
1/1621	. . . . {Group acknowledgement, i.e. the acknowledgement message defining a range of identifiers, e.g. of sequence numbers}		
1/1628	. . . . {List acknowledgements, i.e. the acknowledgement message consisting of a list of identifiers, e.g. of sequence numbers ( <a href="#">H04L 1/1614</a> takes precedence)}		
1/1635	. . . . {Cumulative acknowledgement, i.e. the acknowledgement message applying to all previous messages}		
1/1642	. . . . {Formats specially adapted for sequence numbers}		
1/165	. . . . {Variable formats}		
1/1657	. . . . {Implicit acknowledgement of correct or incorrect reception, e.g. with a moving window}		
1/1664	. . . . {the supervisory signal being transmitted together with payload signals; piggybacking}		

- 1/1893 . . . . . {Physical mapping arrangements ([physical resource mapping in general H04L 5/00](#))}
- 1/1896 . . . . . {ARQ related signaling}
- 1/20 . . . . . using signal quality detector
- 1/201 . . . {Frame classification, e.g. bad, good or erased ([frame indication per se H04L 1/0082](#))}
- 1/203 . . . {Details of error rate determination, e.g. BER, FER or WER}
- 1/205 . . . {jitter monitoring}
- 1/206 . . . {for modulated signals}
- 1/208 . . . {involving signal re-encoding}
- 1/22 . . . using redundant apparatus to increase reliability
- 1/24 . . . Testing correct operation
- 1/241 . . . {using pseudo-errors}
- 1/242 . . . {by comparing a transmitted test signal with a locally generated replica}
- 1/243 . . . {at the transmitter, using a loop-back}
- 1/244 . . . {test sequence generators}
- 1/245 . . . {by using the properties of transmission codes}
- 1/246 . . . {two-level transmission codes, e.g. binary}
- 1/247 . . . {three-level transmission codes, e.g. ternary}
- 1/248 . . . {Distortion measuring systems ([measurement of non-linear distortion G01R 23/20](#); measuring characteristics of individual pulses, e.g. deviation from pulse flatness, rise time, duration [G01R 29/02](#))}
- 5/00 Arrangements affording multiple use of the transmission path**
- 5/0001 . . {Arrangements for dividing the transmission path ([two-way operation using the same type of signal, i.e. duplex H04L 5/14](#))}
- 5/0003 . . . {Two-dimensional division}
- 5/0005 . . . {Time-frequency}
- 5/0007 . . . . {the frequencies being orthogonal, e.g. OFDM(A) or DMT}
- 5/0008 . . . . . {Wavelet-division}
- 5/001 . . . . . {the frequencies being arranged in component carriers}
- 5/0012 . . . . . {Hopping in multicarrier systems}
- 5/0014 . . . {Three-dimensional division}
- 5/0016 . . . {Time-frequency-code}
- 5/0017 . . . . {in which a distinct code is applied, as a temporal sequence, to each frequency}
- 5/0019 . . . . {in which one code is applied, as a temporal sequence, to all frequencies}
- 5/0021 . . . . {in which codes are applied as a frequency-domain sequences, e.g. MC-CDMA}
- 5/0023 . . . {Time-frequency-space}
- 5/0025 . . . . {Spatial division following the spatial signature of the channel}
- 5/0026 . . . {Division using four or more dimensions, e.g. beam steering or quasi-co-location [QCL]}
- 5/0028 . . . {Variable division ([indication of the divided channel H04L 5/0092](#))}
- 5/003 . . . {Arrangements for allocating sub-channels of the transmission path}
- 5/0032 . . . {Distributed allocation, i.e. involving a plurality of allocating devices, each making partial allocation}
- 5/0033 . . . {each allocating device acting autonomously, i.e. without negotiation with other allocating devices}
- 5/0035 . . . {Resource allocation in a cooperative multipoint environment}
- 5/0037 . . . {Inter-user or inter-terminal allocation}
- 5/0039 . . . {Frequency-contiguous, i.e. with no allocation of frequencies for one user or terminal between the frequencies allocated to another}
- 5/0041 . . . {Frequency-non-contiguous}
- 5/0042 . . . {Intra-user or intra-terminal allocation}
- 5/0044 . . . {Allocation of payload; Allocation of data channels, e.g. PDSCH or PUSCH}
- 5/0046 . . . {Determination of the number of bits transmitted on different sub-channels}
- 5/0048 . . . {Allocation of pilot signals, i.e. of signals known to the receiver ([allocation of control signalling H04L 5/0053](#); [use of control signalling H04L 5/0091](#))}
- 5/005 . . . . {of common pilots, i.e. pilots destined for multiple users or terminals}
- 5/0051 . . . . {of dedicated pilots, i.e. pilots destined for a single user or terminal}
- 5/0053 . . . {Allocation of signalling, i.e. of overhead other than pilot signals}
- 5/0055 . . . . {Physical resource allocation for ACK/NACK ([for physical mapping arrangements in ARQ protocols H04L 1/1861](#))}
- 5/0057 . . . . {Physical resource allocation for CQI}
- 5/0058 . . . {Allocation criteria}
- 5/006 . . . . {Quality of the received signal, e.g. BER, SNR, water filling}
- 5/0062 . . . . {Avoidance of ingress interference, e.g. ham radio channels}
- 5/0064 . . . . {Rate requirement of the data, e.g. scalable bandwidth, data priority}
- 5/0066 . . . . {Requirements on out-of-channel emissions}
- 5/0067 . . . . {Allocation algorithms which involve graph matching}
- 5/0069 . . . . {Allocation based on distance or geographical location}
- 5/0071 . . . . {Allocation based on fairness other than the proportional kind}
- 5/0073 . . . . {Allocation arrangements that take into account other cell interferences}
- 5/0075 . . . . {Allocation using proportional fairness}
- 5/0076 . . . . {Allocation utility-based}
- 5/0078 . . . {Timing of allocation}
- 5/008 . . . . {once only, on installation}
- 5/0082 . . . . {at predetermined intervals}
- 5/0083 . . . . . {symbol-by-symbol}
- 5/0085 . . . . {when channel conditions change}
- 5/0087 . . . . {when data requirements change}
- 5/0089 . . . . . {due to addition or removal of users or terminals}
- 5/0091 . . . {Signalling for the administration of the divided path, e.g. signalling of configuration information}
- 5/0092 . . . {Indication of how the channel is divided}
- 5/0094 . . . {Indication of how sub-channels of the path are allocated}
- 5/0096 . . . {Indication of changes in allocation}
- 5/0098 . . . . {Signalling of the activation or deactivation of component carriers, subcarriers or frequency bands}
- 5/02 . . . Channels characterised by the type of signal



- 5/023 . . {Multiplexing of multicarrier modulation signals, e.g. multi-user orthogonal frequency division multiple access [OFDMA] (multicarrier modulation [H04L 27/2601](#))}
- 5/026 . . . {using code division (code allocation applied as frequency-domain sequences [H04L 5/0021](#))}
- 5/04 . . the signals being represented by different amplitudes or polarities, e.g. quadriplex
- 5/06 . . the signals being represented by different frequencies (combined with time-division multiplexing [H04L 5/26](#))
- 5/08 . . . each combination of signals in different channels being represented by a fixed frequency
- 5/10 . . . with dynamo-electric generation of carriers; with mechanical filters or demodulators
- 5/12 . . the signals being represented by different phase modulations of a single carrier
- 5/14 . Two-way operation using the same type of signal, i.e. duplex
- 5/1407 . . {Artificial lines or their setting}
- 5/1415 . . {using control lines}
- 5/1423 . . {for simultaneous baseband signals}
- 5/143 . . {for modulated signals ([H04L 5/1469](#) takes precedence)}
- 5/1438 . . {Negotiation of transmission parameters prior to communication (modified according to link quality [H04L 1/0001](#))}
- 5/1446 . . . {of transmission speed}
- 5/1453 . . . {of modulation type}
- 5/1461 . . {Suppression of signals in the return path, i.e. bidirectional control circuits}
- 5/1469 . . {using time-sharing}
- 5/1476 . . . {operating bitwise}
- 5/1484 . . . {operating byte-wise}
- 5/1492 . . . . {with time compression, e.g. operating according to the ping-pong technique}
- 5/16 . . Half-duplex systems; Simplex/duplex switching; Transmission of break signals {non-automatically inverting the direction of transmission}
- 5/18 . . Automatic changing of the traffic direction
- 5/20 . using different combinations of lines, e.g. phantom working
- 5/22 . using time-division multiplexing
- 5/225 . . {combined with the use of transition coding (transition coding [H04L 25/493](#))}
- 5/24 . . with start-stop synchronous converters
- 5/245 . . . {with a number of discharge tubes or semiconductor elements which successively connect the different channels to the transmission channels (details not particular to receiver or transmitter [H04L 13/00](#); apparatus or local circuits for transmitting or receiving dot-and-dash codes [H04L 15/00](#); apparatus or local circuits for transmitting or receiving codes wherein each character is represented by the same number of equal-length code elements [H04L 17/00](#); apparatus or local circuits for step-by-step systems [H04L 19/00](#); apparatus or local circuits for mosaic printer telegraph systems [H04L 21/00](#); apparatus or local circuits for systems adapted for orthogonal signalling [H04L 23/02](#))}
- 5/26 . . combined with the use of different frequencies
- 7/00 **Arrangements for synchronising receiver with transmitter {(synchronisation of generators of electric oscillations or pulses [H03L 7/00](#))}**
- 7/0004 . {Initialisation of the receiver ([H04L 7/0075](#) and [H04L 7/10](#) take precedence)}
- 7/0008 . {Synchronisation information channels, e.g. clock distribution lines}
- 7/0012 . . {by comparing receiver clock with transmitter clock}
- 7/0016 . {correction of synchronization errors}
- 7/002 . . {correction by interpolation}
- 7/0025 . . . {interpolation of clock signal}
- 7/0029 . . . {interpolation of received data signal}
- 7/0033 . . {Correction by delay}
- 7/0037 . . . {Delay of clock signal}
- 7/0041 . . . {Delay of data signal}
- 7/0045 . . {Correction by a latch cascade}
- 7/005 . . {Correction by an elastic buffer}
- 7/0054 . {Detection of the synchronisation error by features other than the received signal transition (by means of signal transition [H04L 7/033](#))}
- 7/0058 . . {detection of error based on equalizer tap values}
- 7/0062 . . {detection of error based on data decision error, e.g. Mueller type detection}
- 7/0066 . . {detection of error based on transmission code rule}
- 7/007 . . {detection of error based on maximum signal power, e.g. peak value, maximizing autocorrelation}
- 7/0075 . {with photonic or optical means}
- 7/0079 . {Receiver details}
- 7/0083 . . {taking measures against momentary loss of synchronisation, e.g. inhibiting the synchronisation, using idle words or using redundant clocks}
- 7/0087 . . {Preprocessing of received signal for synchronisation, e.g. by code conversion, pulse generation or edge detection}
- 7/0091 . {Transmitter details}
- 7/0095 . {with mechanical means}
- 7/02 . Speed or phase control by the received code signals, the signals containing no special synchronisation information {( [H04L 7/0075](#) takes precedence)}
- 7/027 . . extracting the synchronising or clock signal from the received signal spectrum, e.g. by using a resonant or bandpass circuit
- 7/0272 . . . {with squaring loop}
- 7/0274 . . . {with Costas loop}
- 7/0276 . . . {Self-sustaining, e.g. by tuned delay line and a feedback path to a logical gate}
- 7/0278 . . . {Band edge detection}
- 7/033 . . using the transitions of the received signal to control the phase of the synchronising-signal-generating means, e.g. using a phase-locked loop
- 7/0331 . . . {with a digital phase-locked loop [PLL] processing binary samples, e.g. add/subtract logic for correction of receiver clock ([H04L 7/0337](#) takes precedence)}
- 7/0332 . . . {with an integrator-detector}
- 7/0334 . . . {Processing of samples having at least three levels, e.g. soft decisions}
- 7/0335 . . . . {Gardner detector}

7/0337	. . . {Selecting between two or more discretely delayed clocks or selecting between two or more discretely delayed received code signals}	packet networks, which are covered by <a href="#">H04L 63/00</a> . Attention is drawn to the Note 1. after group <a href="#">H04L 63/00</a>
7/0338	. . . . {the correction of the phase error being performed by a feed forward loop}	2.2 Security arrangements for protecting computers or computer systems against unauthorised activity, which are covered by <a href="#">G06F 21/00</a>
7/04	. Speed or phase control by synchronisation signals {( <a href="#">H04L 7/0075</a> takes precedence)}	3. In subgroups <a href="#">H04L 9/001</a> - <a href="#">H04L 9/38</a> , the last place priority rule is applied, i.e. at each hierarchical level, in the absence of an indication to the contrary, classification is made in the last appropriate place.
7/041	. . {using special codes as synchronising signal}	9/001 . {using chaotic signals}
7/042	. . . {Detectors therefor, e.g. correlators, state machines (digital correlators in general <a href="#">G06F 17/15</a> )}	9/002 . {Countermeasures against attacks on cryptographic mechanisms (network architectures or network communication protocols for protection against malicious traffic <a href="#">H04L 63/1441</a> )}
7/043	. . . {Pseudo-noise [PN] codes variable during transmission (synchronisation of spread spectrum receivers <a href="#">H04B 1/69</a> )}	9/003 . . {for power analysis, e.g. differential power analysis [DPA] or simple power analysis [SPA]}
7/044	. . . {using a single bit, e.g. start stop bit}	9/004 . . {for fault attacks}
2007/045	. . . {Fill bit or bits, idle words}	9/005 . . {for timing attacks}
7/046	. . . {using a dotting sequence}	9/006 . {involving public key infrastructure [PKI] trust models (network architecture or network communication protocol for supporting authentication of entities using certificates in a packet data network <a href="#">H04L 63/0823</a> )}
2007/047	. . . {using a sine signal or unmodulated carrier}	9/007 . . {involving hierarchical structures}
7/048	. . {using the properties of error detecting or error correcting codes, e.g. parity as synchronisation signal}	9/008 . {involving homomorphic encryption}
7/06	. . the synchronisation signals differing from the information signals in amplitude, polarity or frequency {or length}	9/06 . the encryption apparatus using shift registers or memories for block-wise {or stream} coding, e.g. DES systems {or RC4; Hash functions; Pseudorandom sequence generators}
7/065	. . . {and superimposed by modulation}	9/0618 . . {Block ciphers, i.e. encrypting groups of characters of a plain text message using fixed encryption transformation}
7/08	. . the synchronisation signals recurring cyclically	9/0625 . . . {with splitting of the data block into left and right halves, e.g. Feistel based algorithms, DES, FEAL, IDEA or KASUMI}
7/10	. . Arrangements for initial synchronisation	9/0631 . . . {Substitution permutation network [SPN], i.e. cipher composed of a number of stages or rounds each involving linear and nonlinear transformations, e.g. AES algorithms}
9/00	<b>{Cryptographic mechanisms or cryptographic} arrangements for secret or secure communications; Network security protocols</b>	9/0637 . . . {Modes of operation, e.g. cipher block chaining [CBC], electronic codebook [ECB] or Galois/counter mode [GCM]}
<b>NOTES</b>		9/0643 . . {Hash functions, e.g. MD5, SHA, HMAC or f9 MAC}
1. This group covers:		9/065 . . {Encryption by serially and continuously modifying data stream elements, e.g. stream cipher systems, RC4, SEAL or A5/3}
1.1 Cryptographic mechanisms including cryptographic protocols and cryptographic algorithms, whereby a cryptographic protocol is a distributed cryptographic algorithm defined by a sequence of steps precisely specifying the actions required of two or more entities to achieve specific security objectives (e.g. cryptographic protocol for key agreement), and whereby a cryptographic algorithm is specifying the steps followed by a single entity to achieve specific security objectives (e.g. cryptographic algorithm for symmetric key encryption).		9/0656 . . . {Pseudorandom key sequence combined element-for-element with data sequence, e.g. one-time-pad [OTP] or Vernam's cipher}
1.2 <a href="#">H04L 9/00</a> focuses on cryptographic mechanisms such as encryption schemes, digital signatures, hash functions, random number generation, key management, said cryptographic mechanisms providing information security such as privacy or confidentiality, data integrity, message authentication, entity authentication, authorization, validation, certification, time-stamping, anonymity, revocation, non-repudiation.		9/0662 . . . . {with particular pseudorandom sequence generator}
1.3 <a href="#">H04L 9/00</a> covers also countermeasures against attacks on cryptographic mechanisms.		9/0668 . . . . . {producing a non-linear pseudorandom sequence}
2. This group does not cover:		9/08 . Key distribution {or management, e.g. generation, sharing or updating, of cryptographic keys or passwords (network architectures or network communication protocols for supporting key management in a packet data network <a href="#">H04L 63/06</a> )}
2.1 Networking architectures or network communication protocols for securing the traffic flowing through data packet networks and providing secure exchanges among applications communicating through data		

- 9/0816 . . {Key establishment, i.e. cryptographic processes or cryptographic protocols whereby a shared secret becomes available to two or more parties, for subsequent use}
- 9/0819 . . . {Key transport or distribution, i.e. key establishment techniques where one party creates or otherwise obtains a secret value, and securely transfers it to the other(s) ([network architectures or network communication protocols for key distribution in a packet data network H04L 63/062](#))}
- 9/0822 . . . . {using key encryption key}
- 9/0825 . . . . {using asymmetric-key encryption or public key infrastructure [PKI], e.g. key signature or public key certificates}
- 9/0827 . . . . {involving distinctive intermediate devices or communication paths ([network architectures or network communication protocols using different networks H04L 63/18](#))}
- 9/083 . . . . {involving central third party, e.g. key distribution center [KDC] or trusted third party [TTP]}
- 9/0833 . . . . . {involving conference or group key ([network architectures or network communication protocols for key management in group communication in a packet data network H04L 63/065](#))}
- 9/0836 . . . . . {using tree structure or hierarchical structure}
- 9/0838 . . . {Key agreement, i.e. key establishment technique in which a shared key is derived by parties as a function of information contributed by, or associated with, each of these ([network architectures or network communication protocols for key exchange in a packet data network H04L 63/061](#))}
- 9/0841 . . . . {involving Diffie-Hellman or related key agreement protocols}
- 9/0844 . . . . . {with user authentication or key authentication, e.g. ElGamal, MTI, MQV-Menezes-Qu-Vanstone protocol or Diffie-Hellman protocols using implicitly-certified keys}
- 9/0847 . . . . {involving identity based encryption [IBE] schemes}
- 9/085 . . . {Secret sharing or secret splitting, e.g. threshold schemes}
- 9/0852 . . . {Quantum cryptography ([transmission systems employing electromagnetic waves other than radio waves, e.g. light, infrared H04B 10/00; wavelength-division multiplex systems H04J 14/02; WDM arrangements H04J 14/03](#))}
- 9/0855 . . . . {involving additional nodes, e.g. quantum relays, repeaters, intermediate nodes or remote nodes}
- 9/0858 . . . . {Details about key distillation or coding, e.g. reconciliation, error correction, privacy amplification, polarisation coding or phase coding}
- 9/0861 . . {Generation of secret information including derivation or calculation of cryptographic keys or passwords}
- 9/0863 . . . {involving passwords or one-time passwords ([network architectures or network communication protocols for using one-time keys in a packet data network H04L 63/067](#))}
- 9/0866 . . . {involving user or device identifiers, e.g. serial number, physical or biometrical information, DNA, hand-signature or measurable physical characteristics}
- 9/0869 . . . {involving random numbers or seeds}
- 9/0872 . . . {using geo-location information, e.g. location data, time, relative position or proximity to other entities}
- 9/0875 . . . {based on channel impulse response [CIR]}
- 9/0877 . . . {using additional device, e.g. trusted platform module [TPM], smartcard, USB or hardware security module [HSM]}
- 9/088 . . {Usage controlling of secret information, e.g. techniques for restricting cryptographic keys to pre-authorized uses, different access levels, validity of crypto-period, different key- or password length, or different strong and weak cryptographic algorithms ([network architectures or network communication protocols for using time-dependent keys in a packet data network H04L 63/068](#))}
- 9/0891 . . {Revocation or update of secret information, e.g. encryption key update or rekeying}
- 9/0894 . . {Escrow, recovery or storing of secret information, e.g. secret key escrow or cryptographic key storage}
- 9/0897 . . . {involving additional devices, e.g. trusted platform module [TPM], smartcard or USB}
- 9/10 . with particular housing, physical features or manual controls
- 9/12 . Transmitting and receiving encryption devices synchronised or initially set up in a particular manner
- 9/14 . using a plurality of keys or algorithms
- 9/16 . . the keys or algorithms being changed during operation
- 9/30 . Public key, i.e. encryption algorithm being computationally infeasible to invert or user's encryption keys not requiring secrecy
- 9/3006 . . {underlying computational problems or public-key parameters}
- 9/3013 . . . {involving the discrete logarithm problem, e.g. ElGamal or Diffie-Hellman systems}
- 9/302 . . . {involving the integer factorization problem, e.g. RSA or quadratic sieve [QS] schemes}
- 9/3026 . . . {details relating to polynomials generation, e.g. generation of irreducible polynomials}
- 9/3033 . . . {details relating to pseudo-prime or prime number generation, e.g. primality test}
- 9/304 . . {based on error correction codes, e.g. McEliece}
- 9/3066 . . {involving algebraic varieties, e.g. elliptic or hyper-elliptic curves}
- 9/3073 . . . {involving pairings, e.g. identity based encryption [IBE], bilinear mappings or bilinear pairings, e.g. Weil or Tate pairing}
- 9/3093 . . {involving Lattices or polynomial equations, e.g. NTRU scheme}

- 9/32 . . including means for verifying the identity or authority of a user of the system {or for message authentication, e.g. authorization, entity authentication, data integrity or data verification, non-repudiation, key authentication or verification of credentials}
  - 9/321 . . {involving a third party or a trusted authority}
  - 9/3213 . . . {using tickets or tokens, e.g. Kerberos (network architectures or network communication protocols for entities authentication using tickets in a packet data network H04L 63/0807)}
  - 9/3215 . . {using a plurality of channels (network architectures or network communication protocols using different networks H04L 63/18)}
  - 9/3218 . . {using proof of knowledge, e.g. Fiat-Shamir, GQ, Schnorr, or non-interactive zero-knowledge proofs}
  - 9/3221 . . . {interactive zero-knowledge proofs}
  - 9/3226 . . {using a predetermined code, e.g. password, passphrase or PIN (network architectures or network communication protocols for supporting authentication of entities using passwords in a packet data network H04L 63/083)}
  - 9/3228 . . . {One-time or temporary data, i.e. information which is sent for every authentication or authorization, e.g. one-time-password, one-time-token or one-time-key}
  - 9/3231 . . . {Biological data, e.g. fingerprint, voice or retina (network architectures or network communication protocols for supporting authentication of entities using biometrical features in a packet data network H04L 63/0861)}
  - 9/3234 . . {involving additional secure or trusted devices, e.g. TPM, smartcard, USB or software token (network architectures or network communication protocols for supporting authentication of entities using an additional device in a packet data network H04L 63/0853)}
  - 9/3236 . . {using cryptographic hash functions}
  - 9/3239 . . . {involving non-keyed hash functions, e.g. modification detection codes [MDCs], MD5, SHA or RIPEMD}
  - 9/3242 . . . {involving keyed hash functions, e.g. message authentication codes [MACs], CBC-MAC or HMAC}
  - 9/3247 . . {involving digital signatures}
  - 9/3249 . . . {using RSA or related signature schemes, e.g. Rabin scheme}
  - 9/3252 . . . {using DSA or related signature schemes, e.g. elliptic based signatures, ElGamal or Schnorr schemes}
  - 9/3255 . . . {using group based signatures, e.g. ring or threshold signatures}
  - 9/3257 . . . {using blind signatures}
  - 9/3263 . . {involving certificates, e.g. public key certificate [PKC] or attribute certificate [AC]; Public key infrastructure [PKI] arrangements (network architectures or network communication protocols for supporting authentication of entities using certificates in a packet data network H04L 63/0823)}
  - 9/3265 . . . {using certificate chains, trees or paths; Hierarchical trust model}
  - 9/3268 . . . {using certificate validation, registration, distribution or revocation, e.g. certificate revocation list [CRL]}
  - 9/3271 . . {using challenge-response}
  - 9/3273 . . . {for mutual authentication (network architectures or network communication protocols for achieving mutual authentication in a packet data network H04L 63/0869)}
  - 9/3278 . . . {using physically unclonable functions [PUF]}
  - 9/3297 . . {involving time stamps, e.g. generation of time stamps}
  - 9/34 . . Bits, or blocks of bits, of the telegraphic message being interchanged in time {(for speech signals H04K 1/06)}
  - 9/36 . . with means for detecting characters not meant for transmission
  - 9/38 . . Encryption being effected by mechanical apparatus, e.g. rotating cams, switches, keytape punchers
  - 9/40 . . Network security protocols
- NOTE**
- {When allocating H04L 9/40 to patent documents, attention should be made to check whether other subgroups from H04L 63/00 need to be allocated also for a complete classification.}
- 9/50 . . {using hash chains, e.g. blockchains or hash trees}
- 12/00 Data switching networks (interconnection of, or transfer of information or other signals between, memories, input/output devices or central processing units G06F 13/00)**
- 12/02 . . Details
  - 12/04 . . Switchboards
  - 12/06 . . Answer-back mechanisms or circuits
  - 12/08 . . Allotting numbers to messages; Counting characters, words or messages
  - 12/10 . . Current supply arrangements
  - 12/12 . . Arrangements for remote connection or disconnection of substations or of equipment thereof
  - 12/14 . . Charging, metering or billing arrangements specially adapted for data communications, e.g. authentication, authorisation and accounting [AAA] framework
- WARNING**
- Group H04L 12/14 is incomplete pending reclassification of documents from group G06Q 50/40.
- Groups G06Q 50/40 and H04L 12/14 should be considered in order to perform a complete search.
- 12/1403 . . . {Architecture for metering, charging or billing}
  - 12/1407 . . . . {Policy-and-charging control [PCC] architecture}
  - 12/141 . . . {Indication of costs}
  - 12/1414 . . . . {in real-time}
  - 12/1417 . . . . . {Advice of charge with threshold, e.g. user indicating maximum cost}
  - 12/1421 . . . . {Indication of expected costs}
  - 12/1425 . . . {involving dedicated fields in the data packet for billing purposes}



- 12/1428 . . . {Invoice generation, e.g. customization, lay-out, database processing, algorithms for calculating the bill or formatting invoices as WWW pages ([invoicing in general G06Q 30/04](#))}
- 12/1432 . . . {Metric aspects}
- 12/1435 . . . {volume-based}
- 12/1439 . . . {time-based}
- 12/1442 . . . {at network operator level}
- 12/1446 . . . {inter-operator billing}
- 12/145 . . . {trading network capacity or selecting route based on tariff}
- 12/1453 . . . {Methods or systems for payment or settlement of the charges for data transmission involving significant interaction with the data transmission network}
- 12/1457 . . . {using an account}
- 12/146 . . . {using digital cash}
- 12/1464 . . . {using a card, such as credit card, prepaid card or SIM}
- 12/1467 . . . {involving prepayment}
- 12/1471 . . . {splitting of costs}
- 12/1475 . . . {the splitting involving a third party}
- 12/1478 . . . {the splitting involving only the communication parties}
- 12/1482 . . . {involving use of telephony infrastructure for billing for the transport of data, e.g. call detail record [CDR] or intelligent network infrastructure}
- 12/1485 . . . {Tariff-related aspects}
- 12/1489 . . . {dependent on congestion}
- 12/1492 . . . {negotiation of tariff}
- 12/1496 . . . {involving discounts}
- 12/16 . . Arrangements for providing special services to substations
- 12/18 . . . for broadcast or conference {, e.g. multicast}
- 12/1804 . . . {for stock exchange and similar applications}
- 12/1809 . . . {for auctioneering devices}
- 12/1813 . . . {for computer conferences, e.g. chat rooms ([instant messaging H04L 51/04](#); [protocols for multimedia communication H04L 65/1101](#); [arrangements for multi-party communication H04L 65/403](#); [telephonic conference arrangements H04M 3/56](#); [television conference systems H04N 7/15](#))}
- 12/1818 . . . {Conference organisation arrangements, e.g. handling schedules, setting up parameters needed by nodes to attend a conference, booking network resources, notifying involved parties}
- 12/1822 . . . {Conducting the conference, e.g. admission, detection, selection or grouping of participants, correlating users to one or more conference sessions, prioritising transmission}
- 12/1827 . . . {Network arrangements for conference optimisation or adaptation}
- 12/1831 . . . {Tracking arrangements for later retrieval, e.g. recording contents, participants activities or behavior, network status}
- 12/1836 . . . {with heterogeneous network architecture}
- 12/184 . . . {with heterogeneous receivers, e.g. layered multicast}
- 12/1845 . . . {broadcast or multicast in a specific location, e.g. geocast ([protocols for adapting network applications to user terminal location H04L 67/52](#); [services specially adapted for wireless communication networks making use of the location of users or terminals H04W 4/02](#))}
- 12/185 . . . {with management of multicast group membership}
- 12/1854 . . . {with non-centralised forwarding system, e.g. chaincast}
- 12/1859 . . . {adapted to provide push services, e.g. data channels}
- 12/1863 . . . {comprising mechanisms for improved reliability, e.g. status reports ([arrangements for detecting or preventing errors by carrying supervisory signal the return channel H04L 1/16](#))}
- 12/1868 . . . {Measures taken after transmission, e.g. acknowledgments}
- 12/1872 . . . {avoiding ACK or NACK implosion}
- 12/1877 . . . {Measures taken prior to transmission}
- 12/1881 . . . {with schedule organisation, e.g. priority, sequence management}
- 12/1886 . . . {with traffic restrictions for efficiency improvement, e.g. involving subnets or subdomains}
- 12/189 . . . {in combination with wireless systems ([selective distribution or broadcast in wireless communication networks H04W 4/06](#))}
- 12/1895 . . . {for short real-time information, e.g. alarms, notifications, alerts, updates}
- 12/22 . . Arrangements for preventing the taking of data from a data transmission channel without authorisation ([means for verifying the identity or the authority of a user of a secure or secret communication system H04L 9/32](#))
- 12/28 . characterised by path configuration, e.g. LAN [Local Area Networks] or WAN [Wide Area Networks] ([wireless communication networks H04W](#) {; [arrangements for dividing the transmission path H04W 40/00](#))}
- 12/2801 . . {Broadband local area networks}
- 12/2803 . . {Home automation networks}
- 12/2805 . . {Home Audio Video Interoperability [HAVI] networks}
- 12/2807 . . {Exchanging configuration information on appliance services in a home automation network ([arrangements for maintenance or administration involving network analysis for automatically determining the actual topology of a network H04L 41/12](#); [hardware or software tools for network management using graphical user interfaces H04L 41/22](#); [address allocation H04L 61/50](#))}
- 12/2809 . . {indicating that an appliance service is present in a home automation network ([monitoring functionality H04L 43/0817](#); [discovery or management thereof, e.g. service location protocol \[SLP\] or web services, H04L 67/51](#))}

- 12/281 . . . . {indicating a format for calling an appliance service function in a home automation network (for remote control or remote monitoring of applications [H04L 67/025](#))}
- 12/2812 . . . . {describing content present in a home automation network, e.g. audio video content (retrieval from the Internet [G06F 16/95](#))}
- 12/2814 . . . . {Exchanging control software or macros for controlling appliance services in a home automation network (arrangements for maintenance or administration involving configuration of the network and network elements [H04L 41/08](#))}
- 12/2816 . . . . {Controlling appliance services of a home automation network by calling their functionalities (arrangements in telecontrol or telemetry systems for selectively calling a substation from a main station; in which substation desired apparatus is selected for applying a control signal thereto or for obtaining measured values therefrom [H04Q 9/00](#))}
- 12/2818 . . . . {from a device located outside both the home and the home network (access arrangements [H04L 12/2856](#); for remote control or remote monitoring of applications [H04L 67/025](#); arrangements for transmitting signals characterised by the use of a wireless electrical link [G08C 17/00](#); telephonic communication systems adapted for combination with remote control systems [H04M 11/007](#))}
- 12/282 . . . . {based on user interaction within the home (receiver circuitry for displaying additional information being controlled by a remote control apparatus [H04N 21/42204](#))}
- 12/2821 . . . . {Avoiding conflicts related to the use of home appliances (cryptographic protocols [H04L 9/00](#); protocols for network security [H04L 63/00](#))}
- 12/2823 . . . . {Reporting information sensed by appliance or service execution status of appliance services in a home automation network (device-related reporting [H04L 43/065](#); arrangements in telecontrol or telemetry systems for selectively calling a substation from a main station, in which substation desired apparatus is selected for applying a control signal thereto or for obtaining measured values therefrom [H04Q 9/00](#))}
- 12/2825 . . . . {Reporting to a device located outside the home and the home network (access arrangements [H04L 12/2856](#); for remote control or remote monitoring of applications [H04L 67/025](#); telephonic communication systems adapted for combination with telemetering systems [H04M 11/002](#))}
- 12/2827 . . . . {Reporting to a device within the home network; wherein the reception of the information reported automatically triggers the execution of a home appliance functionality}
- 12/2829 . . . . . {involving user profiles according to which the execution of a home appliance functionality is automatically triggered}
- 12/283 . . . . {Processing of data at an internetworking point of a home automation network}
- 12/2832 . . . . {Interconnection of the control functionalities between home networks (single bridge functionality [H04L 12/4625](#))}
- 12/2834 . . . . {Switching of information between an external network and a home network (access arrangements [H04L 12/2856](#))}
- 12/2836 . . . . {Protocol conversion between an external network and a home network (controlling appliance services of a home automation network from a device located outside the home and the home network [H04L 12/2818](#); protocol conversion [H04L 69/08](#); adaptation of digital video signals for transport over a specific home network [H04N 7/24](#))}
- 12/2838 . . . . {Distribution of signals within a home automation network, e.g. involving splitting/multiplexing signals to/from different paths (adaptations of television systems for transmission by electric cable for domestic distribution [H04N 7/106](#); hybrid transport [H04L 12/6418](#); home network arrangements specially adapted for distribution of digital video signals [H04N 7/24](#))}
- 2012/284 . . . . {characterised by the type of medium used}
- 2012/2841 . . . . . {Wireless}
- 2012/2843 . . . . . {Mains power line}
- 2012/2845 . . . . . {Telephone line}
- 2012/2847 . . . . {characterised by the type of home appliance used}
- 2012/2849 . . . . . {Audio/video appliances}
- 2012/285 . . . . . {Generic home appliances, e.g. refrigerators}
- 12/2852 . . . {Metropolitan area networks}
- 12/2854 . . . {Wide area networks, e.g. public data networks}
- 12/2856 . . . . {Access arrangements, e.g. Internet access (asynchronous transfer mode networks [H04L 12/5601](#); broadband local area networks [H04L 12/2801](#); optical access or distribution networks [H04Q 11/0067](#); access to open networks [H04L 12/5691](#); digital subscriber line end-user equipment and bit-level processing of data on a PSTN-based network [H04M 11/00](#); home network gateways [H04L 12/2834](#); wireless access networks [H04W](#))}

## NOTES

1. {This group covers:
  - access to a public data network, such as an IP network, for subscribers, i.e. customers of a network service provider, over a wired network.
  - communication of generic types of data between end-user equipments, located typically at the subscriber premises, and an access server, which acts as interface between the access network and the public data network. }
2. {This group does not cover:
  - wireless access networks, which are covered by [H04W](#)
  - optical distribution networks, which are covered by [H04Q 11/0067](#)
  - bit-level, or PHY layer, processing of data between digital subscriber

		line equipments, which is covered by <a href="#">H04M 11/06</a>	12/2869	. . . . .	{Operational details of access network equipments ( <a href="#">admission control or resource allocation in access networks H04L 12/5692</a> )}
		• design of DSL, digital subscriber line, modems, which is covered by <a href="#">H04M 11/06</a>	12/287	. . . . .	{Remote access server, e.g. BRAS}
		• exchange of data related to functionalities of home network appliances between a home network and an external network, which is covered by <a href="#">H04L 12/2803</a>	12/2872	. . . . .	{Termination of subscriber connections}
		• management of WDM parameters in optical multiplex systems, which is covered by <a href="#">H04J 14/02</a>	12/2874	. . . . .	{Processing of data for distribution to the subscribers}
		• circuit-switched access networks, which are covered by <a href="#">H04M 7/1205</a>	12/2876	. . . . .	{Handling of subscriber policies ( <a href="#">group policies management H04L 41/0893</a> )}
		• access arrangements for providing telephone service in networks other than PSTN/ISDN, which are covered by <a href="#">H04M 7/0066</a> }	12/2878	. . . . .	{Access multiplexer, e.g. DSLAM ( <a href="#">generic distributed time multiplexers, e.g. TDM/TDMA H04J 3/1694</a> )}
3.	{In this group the following terms or expressions are used with the meaning indicated:		12/2879	. . . . .	{characterised by the network type on the uplink side, i.e. towards the service provider network}
		• ATM means Asynchronous Transfer Mode	12/2881	. . . . .	{IP/Ethernet DSLAM}
		• LAN means Local Area Network	12/2883	. . . . .	{ATM DSLAM}
		• BRAS means Broadband Remote Access Server	12/2885	. . . . .	{Arrangements interfacing with optical systems ( <a href="#">optical network equipment H04B 10/00</a> ; <a href="#">optical multiplexers H04J 14/05</a> and <a href="#">H04J 14/07</a> )}
		• DSLAM means Digital Subscriber Line Access Multiplexer	12/2887	. . . . .	{characterised by the offered subscriber services}
		• MSAN means MultiService Access Node	12/2889	. . . . .	{Multiservice, e.g. MSAN}
		• DSL means Digital Subscriber Line	12/289	. . . . .	{Single service}
		• IP means Internet Protocol	12/2892	. . . . .	{characterised by the access multiplexer architecture}
		• WDM means Wavelength Division Multiplexing	12/2894	. . . . .	{Centralized processing}
		• SDH means Synchronous Digital Hierarchy	12/2896	. . . . .	{Distributed processing, e.g. on line cards}
		• OTN means Optical Transport Network	12/2898	. . . . .	{Subscriber equipments ( <a href="#">DSL modems H04M 11/062</a> ; <a href="#">cable modems H04L 12/2801</a> )}
		• PSTN means Public Switched Telephone Network	12/40	. . .	Bus networks
		• ISDN means Integrated Services Digital Network	12/40006	. . .	{Architecture of a communication node ( <a href="#">current supply arrangements H04L 12/10</a> ; <a href="#">intermediate storage or scheduling H04L 49/90</a> )}
		• TDM means Time-Division Multiplexing	<b>NOTE</b>		
		• TDMA means Time Division Multiple Access }	{ In this group the following terms or expressions are used with the meaning indicated:		
12/2858	. . . . .	{Access network architectures}	• a bus controller is a microprocessor dedicated to input and output of data by a node on a bus;		
12/2859	. . . . .	{Point-to-point connection between the data network and the subscribers ( <a href="#">encapsulation H04L 12/4633</a> ; <a href="#">virtual LANs H04L 12/4641</a> ; <a href="#">routing of packets H04L 45/00</a> )}	• a bus master is a device controlling which node accesses the bus at a particular time;		
12/2861	. . . . .	{Point-to-multipoint connection from the data network to the subscribers}	• a bus guardian is a device monitoring the timing of node accesses on the bus;		
12/2863	. . . . .	{Arrangements for combining access network resources elements, e.g. channel bonding ( <a href="#">modem pooling H04L 25/14</a> ; <a href="#">routing of packets H04L 45/00</a> ; <a href="#">multichannel or multilink protocols H04L 69/14</a> )}	• a bus interface enhancer is a hardware or software arrangement managing the bus controller or the bus interface to modify its behaviour or providing a transparent interface to the bus controller. }		
12/2865	. . . . .	{Logical combinations}	12/40013	. . . . .	{Details regarding a bus controller}
12/2867	. . . . .	{Physical combinations}	12/40019	. . . . .	{Details regarding a bus master}
			12/40026	. . . . .	{Details regarding a bus guardian}
			12/40032	. . . . .	{Details regarding a bus interface enhancer}

12/40039 . . . .	{Details regarding the setting of the power status of a node according to activity on the bus}	12/40176 . . . .	{involving redundancy (error detection or correction of the data by redundancy in hardware using active fault-masking in interconnections <a href="#">G06F 11/2002</a> ; error detection or correction of the data by redundancy in hardware using active fault-masking in storage systems using spares or by reconfiguring <a href="#">G06F 11/2053</a> )}
12/40045 . . . .	{Details regarding the feeding of energy to the node from the bus}	12/40182 . . . .	{by using a plurality of communication lines}
12/40052 . . . .	{High-speed IEEE 1394 serial bus (bus transfer protocol on a daisy chain bus using an embedded synchronisation <a href="#">G06F 13/426</a> )}	12/40189 . . . .	{by using a plurality of bus systems}
12/40058 . . . .	{Isochronous transmission}	12/40195 . . . .	{by using a plurality of nodes}
12/40065 . . . .	{Bandwidth and channel allocation (home automation networks <a href="#">H04L 12/2803</a> ; flow control <a href="#">H04L 47/10</a> )}	12/40202 . . . .	{by using a plurality of master stations}
12/40071 . . . .	{Packet processing; Packet format (adaptation of digital video signals for transport over a specific network <a href="#">H04N 21/2381</a> , <a href="#">H04N 21/4363</a> , <a href="#">H04N 21/4381</a> ; packet switches <a href="#">H04L 49/00</a> ; intermediate storage or scheduling <a href="#">H04L 49/90</a> )}	2012/40208 . . . .	{characterized by the use of a particular bus standard}
12/40078 . . . .	{Bus configuration (home automation networks <a href="#">H04L 12/2803</a> ; arrangements for maintenance or administration <a href="#">H04L 41/00</a> )}	<b>NOTE</b>	
12/40084 . . . .	{Bus arbitration}	{In this group the following terms or expressions are used with the meaning indicated:	
12/40091 . . . .	{Bus bridging (LAN interconnection over a bridge based backbone <a href="#">H04L 12/462</a> ; single bridge functionality <a href="#">H04L 12/462</a> )}	<ul style="list-style-type: none"> <li>• Controller-area network (CAN or CAN-bus) designates a computer network protocol and bus standard developed in 1983 by Intel Corporation and Robert Bosch GmbH to allow microcontrollers and devices to communicate with each other without a host computer;</li> </ul>	
12/40097 . . . .	{Interconnection with other networks (LAN interconnection over a bridge based backbone <a href="#">H04L 12/462</a> ; single bridge functionality <a href="#">H04L 12/462</a> )}	<ul style="list-style-type: none"> <li>• PROFIBUS (Process Field Bus) designates a standard for field bus communication in automation technology first implemented in 1989 by BMBF, the german department of education and research;</li> </ul>	
12/40104 . . . .	{Security; Encryption; Content protection (cryptographic protocols <a href="#">H04L 9/00</a> ; protocols for network security <a href="#">H04L 63/00</a> )}	<ul style="list-style-type: none"> <li>• Modbus designates a serial communications protocol published by Modicon in 1979 for use with its programmable logic controller;</li> </ul>	
12/40117 . . . .	{Interconnection of audio or video/imaging devices (home automation networks <a href="#">H04L 12/2803</a> ; bitstream network arrangements specially adapted for distribution of digital video signals <a href="#">H04N 7/24</a> )}	<ul style="list-style-type: none"> <li>• LIN-Bus (Local Interconnect Network) designates a computer networking bus-system released in 1999 used within current automotive network architectures;</li> </ul>	
12/40123 . . . .	{Interconnection of computers and peripherals (printer information exchange with computer <a href="#">G06F 3/1293</a> )}	<ul style="list-style-type: none"> <li>• FlexRay designates an automotive network communications protocol developed by the FlexRay Consortium;</li> </ul>	
12/4013 . . . .	{Management of data rate on the bus (systems modifying transmission characteristics according to link quality <a href="#">H04L 1/0001</a> )}	<ul style="list-style-type: none"> <li>• LON or LonWorks designates a network standard operating on twisted pair or electrical wiring or coaxial cable and used for building automation;</li> </ul>	
12/40136 . . . .	{Nodes adapting their rate to the physical link properties (LAN switches <a href="#">H04L 49/351</a> )}	<ul style="list-style-type: none"> <li>• ASI or AS-Interface (Actuator Sensor Interface) designates the simplest of the industrial networking protocols used in programmable logic controller systems}</li> </ul>	
12/40143 . . . .	{involving priority mechanisms (hybrid switching fabrics <a href="#">H04L 12/6402</a> ; intermediate storage or scheduling <a href="#">H04L 49/90</a> ; time-division multiplex systems <a href="#">H04J 3/00</a> )}	2012/40215 . . . .	{Controller Area Network CAN}
12/4015 . . . .	{by scheduling the transmission of messages at the communication node}	2012/40221 . . . .	{Profibus}
12/40156 . . . .	{by using dedicated slots associated with a priority level}	2012/40228 . . . .	{Modbus}
12/40163 . . . .	{by assigning priority to messages according to a message field}	2012/40234 . . . .	{Local Interconnect Network LIN}
12/40169 . . . .	{Flexible bus arrangements (arrangements for maintenance or administration involving management of faults; events, alarms <a href="#">H04L 41/06</a> ; automatic restoration of network faults <a href="#">H04L 41/0654</a> )}	2012/40241 . . . .	{Flexray}
		2012/40247 . . . .	{LON}
		2012/40254 . . . .	{Actuator Sensor Interface ASI}
		2012/4026 . . . .	{Bus for use in automation systems}



- 2012/40267 . . . {Bus for use in transportation systems}
- 2012/40273 . . . . {the transportation system being a vehicle}
- 2012/4028 . . . . {the transportation system being an aircraft}
- 2012/40286 . . . . {the transportation system being a waterborne vessel}
- 2012/40293 . . . . {the transportation system being a train}
- 12/403 . . . with centralised control, e.g. polling
- 12/4035 . . . . {in which slots of a TDMA packet structure are assigned based on a contention resolution carried out at a master unit (TDM/TDMA multiplex systems [per se H04J 3/1694](#); hybrid switching systems [H04L 12/64](#))}
- 12/407 . . . with decentralised control
- 12/413 . . . . with random access, e.g. carrier-sense multiple-access with collision detection [CSMA-CD]
- 12/4135 . . . . . {using bit-wise arbitration}
- 12/417 . . . . with deterministic access, e.g. token passing
- 12/42 . . Loop networks
- 2012/421 . . . {Interconnected ring systems}
- 12/422 . . . {Synchronisation for ring networks (Time Division Multiplex ring networks, e.g. SDH/SONET [H04J 3/085](#))}
- 12/423 . . . with centralised control, e.g. polling
- 12/427 . . . with decentralised control
- 12/43 . . . . with synchronous transmission, e.g. time division multiplex [TDM], slotted rings
- 12/433 . . . . with asynchronous transmission, e.g. token ring, register insertion
- 12/437 . . . Ring fault isolation or reconfiguration {(for SDH/SONET ring networks [H04J 3/085](#))}
- 12/44 . . Star or tree networks
- 2012/445 . . . {with switching in a hub, e.g. ETHERNET switch}
- 12/46 . . Interconnection of networks
- 12/4604 . . . {LAN interconnection over a backbone network, e.g. Internet, Frame Relay}
- 12/4608 . . . . {LAN interconnection over ATM networks}
- 12/4612 . . . . {LAN interconnection over narrowband networks, e.g. N-ISDN, PSTN, X.25}
- 12/4616 . . . . {LAN interconnection over a LAN backbone}
- 12/462 . . . . {LAN interconnection over a bridge based backbone}
- 12/4625 . . . . . {Single bridge functionality, e.g. connection of two networks over a single bridge}
- 2012/4629 . . . . {using multilayer switching, e.g. layer 3 switching}
- 12/4633 . . . {Interconnection of networks using encapsulation techniques, e.g. tunneling}
- 12/4637 . . . {Interconnected ring systems}
- 12/4641 . . . {Virtual LANs, VLANs, e.g. virtual private networks [VPN] (LAN interconnection over a bridge based backbone [H04L 12/462](#); encapsulation techniques [H04L 12/4633](#); routing of packets [H04L 45/00](#); packet switches [H04L 49/00](#); virtual private networks for security [H04L 63/0272](#))}
- as if they were attached to the same broadcast domain, regardless of their physical location. }
2. {This group does not cover:
- group multicasting, which is covered by group [H04L 12/18](#)
  - configuration of switches supporting VLANs, which is covered by group [H04L 41/08](#)
  - multiprotocol label switching [MPLS], which is covered by group [H04L 45/00](#)
  - spanning tree protocols [STP], which are covered by group [H04L 12/462](#)
  - arrangements for network security, which are covered by group [H04L 63/0272](#)
  - encapsulation techniques, which are covered by group [H04L 12/4633](#)
  - access arrangements, which are covered by group [H04L 12/2856](#)
3. {In this group the following terms or expressions are used with the meaning indicated:
- B-Tag means Backbone VLAN Tag
  - C-Tag means Customer VLAN Tag
  - GARP means Generic Attribute Registration Protocol
  - GVRP means GARP VLAN Registration Protocol
  - I-SID means Service Instance Identifier
  - MVRP means Multiple VLAN Registration Protocol
  - PBB means Provider Backbone Bridges
  - S-Tag means Service VLAN Tag
  - VLAN means Virtual Local Area Network
  - VPN means Virtual Private Network
  - VTP means VLAN Trunking Protocol}
- 12/4645 . . . . {Details on frame tagging (routing of packets [H04L 45/00](#); support for virtual LAN [H04L 49/354](#))}
- 12/465 . . . . . {wherein a single frame includes a plurality of VLAN tags}
- 12/4654 . . . . . {wherein a VLAN tag represents a customer VLAN, e.g. C-Tag}
- 12/4658 . . . . . {wherein a VLAN tag represents a service provider backbone VLAN, e.g. B-Tag, S-Tag}
- 12/4662 . . . . . {wherein a VLAN tag represents a service instance, e.g. I-SID in PBB}
- 12/4666 . . . . . {Operational details on the addition or the stripping of a tag in a frame, e.g. at a provider edge node}
- 12/467 . . . . {Arrangements for supporting untagged frames, e.g. port-based VLANs}
- 12/4675 . . . . {Dynamic sharing of VLAN information amongst network nodes (configuration of the network or of network elements [H04L 41/08](#))}

## NOTES

1. {This group covers:
  - a group of hosts with a common set of requirements that communicate

12/4679	. . . . .	{Arrangements for the registration or de-registration of VLAN attribute values, e.g. VLAN identifiers, port VLAN membership}	2012/5636	. . . . .	{Monitoring or policing, e.g. compliance with allocated rate, corrective actions}
12/4683	. . . . .	{characterized by the protocol used}	2012/5637	. . . . .	{Leaky Buckets}
12/4687	. . . . .	{MVRP [multiple VLAN registration protocol]}	2012/5638	. . . . .	{Services, e.g. multimedia, GOS, QOS}
12/4691	. . . . .	{GVRP [GARP VLAN registration protocol]}	2012/5639	. . . . .	{Tariffs or charging}
12/4695	. . . . .	{VTP [VLAN trunking protocol]}	2012/564	. . . . .	{Connection-oriented}
12/50	. . . . .	Circuit switching systems, i.e. systems in which the path is physically permanent during the communication	2012/5641	. . . . .	{Unicast/point-to-point}
12/52	. . . . .	using time division techniques (in digital transmission systems <a href="#">H04L 5/22</a> )	2012/5642	. . . . .	{Multicast/broadcast/point-multipoint, e.g. VOD}
12/525	. . . . .	{involving a stored program control}	2012/5643	. . . . .	{Concast/multipoint-to-point}
12/54	. . . . .	Store-and-forward switching systems (packet switching systems <a href="#">H04L 45/00</a> , <a href="#">H04L 47/00</a> )	2012/5645	. . . . .	{Connectionless}
12/56	. . . . .	{Packet switching systems}	2012/5646	. . . . .	{Cell characteristics, e.g. loss, delay, jitter, sequence integrity}
12/5601	. . . . .	{Transfer mode dependent, e.g. ATM}	2012/5647	. . . . .	{Cell loss}
12/5602	. . . . .	{Bandwidth control in ATM Networks, e.g. leaky bucket}	2012/5648	. . . . .	{Packet discarding, e.g. EPD, PTD}
2012/5603	. . . . .	{Access techniques}	2012/5649	. . . . .	{Cell delay or jitter}
2012/5604	. . . . .	{Medium of transmission, e.g. fibre, cable, radio}	2012/565	. . . . .	{Sequence integrity}
2012/5605	. . . . .	{Fibre}	2012/5651	. . . . .	{Priority, marking, classes}
2012/5606	. . . . .	{Metallic}	2012/5652	. . . . .	{Cell construction, e.g. including header, packetisation, depacketisation, assembly, reassembly}
2012/5607	. . . . .	{Radio}	2012/5653	. . . . .	{using the ATM adaptation layer [AAL]}
2012/5608	. . . . .	{Satellite}	2012/5654	. . . . .	{using the AAL1}
2012/5609	. . . . .	{Topology}	2012/5656	. . . . .	{using the AAL2}
2012/561	. . . . .	{Star, e.g. cross-connect, concentrator, subscriber group equipment, remote electronics}	2012/5657	. . . . .	{using the AAL3/4}
2012/5612	. . . . .	{Ring}	2012/5658	. . . . .	{using the AAL5}
2012/5613	. . . . .	{Bus (including DQDB)}	2012/5659	. . . . .	{using the AALX}
2012/5614	. . . . .	{User Network Interface}	2012/566	. . . . .	{using the ATM layer}
2012/5615	. . . . .	{Network termination, e.g. NT1, NT2, PBX}	2012/5661	. . . . .	{Minicells}
2012/5616	. . . . .	{Terminal equipment, e.g. codecs, synch.}	2012/5662	. . . . .	{Macrocells or frames}
2012/5617	. . . . .	{Virtual LANs; Emulation of LANs}	2012/5663	. . . . .	{Support of N-ISDN}
2012/5618	. . . . .	{Bridges, gateways [GW] or interworking units [IWU]}	2012/5664	. . . . .	{Support of Video, e.g. MPEG}
2012/5619	. . . . .	{Network Node Interface, e.g. tandem connections, transit switching}	2012/5665	. . . . .	{Interaction of ATM with other protocols}
2012/562	. . . . .	{Routing}	2012/5667	. . . . .	{IP over ATM}
2012/5621	. . . . .	{Virtual private network [VPN]; Private-network - network-interface (P-NNI)}	2012/5668	. . . . .	{Next hop resolution protocol [NHRP]}
2012/5623	. . . . .	{Network design, dimensioning, topology or optimisation}	2012/5669	. . . . .	{Multiprotocol over ATM [MPOA]}
2012/5624	. . . . .	{Path aspects, e.g. path bundling}	2012/567	. . . . .	{Frame Relay over ATM}
2012/5625	. . . . .	{Operations, administration and maintenance [OAM]}	2012/5671	. . . . .	{Support of voice}
2012/5626	. . . . .	{Network management, e.g. Intelligent nets}	2012/5672	. . . . .	{Multiplexing, e.g. coding, scrambling}
2012/5627	. . . . .	{Fault tolerance and recovery}	2012/5673	. . . . .	{Coding or scrambling}
2012/5628	. . . . .	{Testing}	2012/5674	. . . . .	{Synchronisation, timing recovery or alignment}
2012/5629	. . . . .	{Admission control}	2012/5675	. . . . .	{Timeslot assignment, e.g. TDMA}
2012/563	. . . . .	{Signalling, e.g. protocols, reference model}	2012/5676	. . . . .	{Code Division Multiple Access [CDMA]}
2012/5631	. . . . .	{Resource management and allocation}	2012/5678	. . . . .	{Traffic aspects, e.g. arbitration, load balancing, smoothing, buffer management}
2012/5632	. . . . .	{Bandwidth allocation}	2012/5679	. . . . .	{Arbitration or scheduling}
2012/5634	. . . . .	{In-call negotiation}	2012/568	. . . . .	{Load balancing, smoothing or shaping}
2012/5635	. . . . .	{Backpressure, e.g. for ABR}	2012/5681	. . . . .	{Buffer or queue management}
			2012/5682	. . . . .	{Threshold; Watermark}
			2012/5683	. . . . .	{for avoiding head of line blocking}
			2012/5684	. . . . .	{Characteristics of traffic flows}
			2012/5685	. . . . .	{Addressing issues}
			2012/5686	. . . . .	{Use of neural networks}
			2012/5687	. . . . .	{Security aspects}
			12/5691	. . . . .	{Access to open networks; Ingress point selection, e.g. ISP selection}
			12/5692	. . . . .	{Selection among different networks}
			12/64	. . . . .	Hybrid switching systems

12/6402	. . {Hybrid switching fabrics}	13/188	. . {Projection of the printed matter}
2012/6405	. . . {Space}	<b>15/00</b>	<b>Apparatus or local circuits for transmitting or receiving dot-and-dash codes, e.g. Morse code (teaching apparatus therefor <a href="#">G09B</a>; telegraph tapping keys <a href="#">H01H 21/86</a>)</b>
2012/6408	. . . {Shared Medium, e.g. memory, bus, ring}	15/03	. Keys structurally combined with sound generators
2012/641	. . . {Time switching}	15/04	. Apparatus or circuits at the transmitting end
2012/6413	. . . {Switch peripheries}	15/06	. . with a restricted number of keys, e.g. separate key for each type of code element
2012/6416	. . . {Switch multicast}	15/08	. . . with a single key which transmits dots in one position and dashes in a second position
12/6418	. . {Hybrid transport}	15/10	. . . combined with perforating apparatus
2012/6421	. . . {Medium of transmission, e.g. fibre, cable, radio, satellite}	15/12	. . with keyboard co-operating with code-bars
2012/6424	. . . {Access arrangements}	15/14	. . . combined with perforating apparatus
2012/6427	. . . . {Subscriber Access Module; Concentrator; Group equipment}	15/16	. . with keyboard co-operating with code discs
2012/6429	. . . {Terminal adapters}	15/18	. . Automatic transmitters, e.g. controlled by perforated tape
2012/6432	. . . {Topology}	15/20	. . . with optical sensing means
2012/6435	. . . . {Bus}	15/22	. . Apparatus or circuits for sending one or a restricted number of signals, e.g. distress signals
2012/6437	. . . . {Ring}	15/24	. Apparatus or circuits at the receiving end
2012/644	. . . . {Star}	15/26	. . operating only on reception of predetermined code signals, e.g. distress signals, party-line call signals
2012/6443	. . . {Network Node Interface, e.g. Routing, Path finding}	15/28	. . Code reproducing apparatus
2012/6445	. . . {Admission control}	15/285	. . . {Telegraph sounders; Apparatus for acoustic reception}
2012/6448	. . . . {Medium Access Control [MAC]}	15/30	. . . Writing recorders
2012/6451	. . . . . {Deterministic, e.g. Token, DQDB}	15/32	. . . Perforating recorders
2012/6454	. . . . . {Random, e.g. Ethernet}	15/34	. . Apparatus for recording received coded signals after translation, e.g. as type-characters
2012/6456	. . . . {Channel and bandwidth allocation}	<b>17/00</b>	<b>Apparatus or local circuits for transmitting or receiving codes wherein each character is represented by the same number of equal-length code elements, e.g. Baudot code</b>
2012/6459	. . . . {Multiplexing, e.g. TDMA, CDMA}	17/02	. Apparatus or circuits at the transmitting end
2012/6462	. . . . {Movable boundaries in packets or frames}	17/04	. . with keyboard co-operating with code-bars
2012/6464	. . . {Priority}	17/06	. . . Contact operating means
2012/6467	. . . {Information loss recovery, e.g. error correction, prediction}	17/08	. . . combined with perforating apparatus
2012/647	. . . {Frame Relay, X.25}	17/10	. . with keyboard co-operating with code-discs
2012/6472	. . . {Internet}	17/12	. . Automatic transmitters, e.g. controlled by perforated tape
2012/6475	. . . {N-ISDN, Public Switched Telephone Network [PSTN]}	17/14	. . . with optical sensing means
2012/6478	. . . {Digital subscriber line, e.g. DSL, ADSL, HDSL, XDSL, VDSL}	17/16	. Apparatus or circuits at the receiving end
2012/6481	. . . {Speech, voice}	17/18	. . Code selection mechanisms
2012/6483	. . . {Video, e.g. MPEG}	17/20	. . using perforating recorders
2012/6486	. . . {Signalling Protocols}	17/22	. . using mechanical translation and type-bar printing
2012/6489	. . . {Buffer Management, Threshold setting, Scheduling, Shaping}	17/24	. . using mechanical translation and type-head printing, e.g. type-wheel, type-cylinder
2012/6491	. . . {Echo cancellation}	17/26	. . using aggregate motion translation
2012/6494	. . . {Silence suppression}	17/28	. . using pneumatic or hydraulic translation
2012/6497	. . . {Feedback to the source}	17/30	. . using electric or electronic translation
12/66	. Arrangements for connecting between networks having differing types of switching systems, e.g. gateways	<b>19/00</b>	<b>Apparatus or local circuits for step-by-step systems</b>
<b>13/00</b>	<b>Details of the apparatus or circuits covered by groups <a href="#">H04L 15/00</a> or <a href="#">H04L 17/00</a></b>	<b>21/00</b>	<b>Apparatus or local circuits for mosaic printer telegraph systems</b>
13/02	. Details not particular to receiver or transmitter	21/02	. at the transmitting end
13/04	. . Driving mechanisms; Clutches	21/04	. at the receiving end
13/06	. . Tape or page guiding or feeding devices	<b>23/00</b>	<b>Apparatus or local circuits for systems other than those covered by groups <a href="#">H04L 15/00</a> - <a href="#">H04L 21/00</a></b>
13/08	. . Intermediate storage means		
13/10	. . Distributors		
13/12	. . . Non-mechanical distributors, e.g. relay distributors		
13/14	. . . . Electronic distributors		
13/16	. of transmitters, e.g. code-bars, code-discs		
13/18	. of receivers		
13/182	. . {Printing mechanisms}		
13/184	. . . {Photographic printing and recording}		
13/186	. . {Page printing; tabulating}		

23/02	. adapted for orthogonal signalling	25/0278	. . . {Arrangements for impedance matching}
<b>25/00</b>	<b>Baseband systems</b>	25/028	. . . {Arrangements specific to the transmitter end}
25/02	. Details {; arrangements for supplying electrical power along data transmission lines ( <a href="#">systems for transmitting signals via power distribution lines H04B 3/54</a> )}	25/0282	. . . . {Provision for current-mode coupling}
25/0202	. . {Channel estimation}	25/0284	. . . . {Arrangements to ensure DC-balance}
25/0204	. . . {of multiple channels}	25/0286	. . . . {Provision of wave shaping within the driver ( <a href="#">wave shaping per se H04L 25/03834</a> )}
25/021	. . . {Estimation of channel covariance}	25/0288	. . . . . {the shape being matched to the transmission line ( <a href="#">pre-equalisation per se H04L 25/03343</a> )}
25/0212	. . . {of impulse response}	25/029	. . . . . {Provision of high-impedance states}
25/0214	. . . . {of a single coefficient}	25/0292	. . . . {Arrangements specific to the receiver end}
25/0216	. . . . {with estimation of channel length}	25/0294	. . . . {Provision for current-mode coupling}
25/0218	. . . . {with detection of nulls}	25/0296	. . . . {Arrangements to ensure DC-balance}
25/022	. . . {of frequency response}	25/0298	. . . {Arrangement for terminating transmission lines}
25/0222	. . . {Estimation of channel variability, e.g. coherence bandwidth, coherence time, fading frequency}	25/03	. . Shaping networks in transmitter or receiver, e.g. adaptive shaping networks
25/0224	. . . . {using sounding signals}	25/03006	. . . . {Arrangements for removing intersymbol interference}
25/0226	. . . . . {sounding signals <a href="#">per se</a> }	25/03012	. . . . . {operating in the time domain ( <a href="#">H04L 25/03165</a> , <a href="#">H04L 25/03178 take precedence</a> )}
25/0228	. . . . . {with direct estimation from sounding signals}	25/03019	. . . . . {adaptive, i.e. capable of adjustment during data reception}
25/023	. . . . . {with extension to other symbols}	25/03025	. . . . . {using a two-tap delay line}
25/0232	. . . . . . {by interpolation between sounding signals}	25/03031	. . . . . . {using only passive components ( <a href="#">H04L 25/03025 takes precedence</a> )}
25/0234	. . . . . . . {by non-linear interpolation}	25/03038	. . . . . . . {with a non-recursive structure ( <a href="#">H04L 25/03031 takes precedence</a> )}
25/0236	. . . . . . . {using estimation of the other symbols}	25/03044	. . . . . . . {using fractionally spaced delay lines or combinations of fractionally integrally spaced taps}
25/0238	. . . . {using blind estimation}	25/0305	. . . . . . . {using blind adaptation}
25/024	. . . . {channel estimation algorithms}	25/03057	. . . . . . . {with a recursive structure ( <a href="#">H04L 25/03031 takes precedence</a> )}
25/0242	. . . . . {using matrix methods}	25/03063	. . . . . . . {using fractionally spaced delay lines or combinations of fractionally and integrally spaced taps}
25/0244	. . . . . . {with inversion}	25/0307	. . . . . . . {using blind adaptation}
25/0246	. . . . . . . {with factorisation}	25/03076	. . . . . . . {not using decision feedback}
25/0248	. . . . . . . {Eigen-space methods}	25/03082	. . . . . . . {Theoretical aspects of adaptive time domain methods}
25/025	. . . . . {using least-mean-square [LMS] method}	25/03089	. . . . . . . {Theory of blind algorithms, recursive or not}
25/0252	. . . . . {using third or higher order statistics}	25/03095	. . . . . . . {Theory of fractional equalisers, recursive or not}
25/0254	. . . . . {using neural network algorithms}	25/03101	. . . . . . . {Theory of the Kalman algorithm}
25/0256	. . . . . {Channel estimation using minimum mean square error criteria}	25/03108	. . . . . . . {Theory of recursive equalisers, other than Kalman}
25/0258	. . . . . {Channel estimation using zero-forcing criteria}	25/03114	. . . . . . . {non-adaptive, i.e. not adjustable, manually adjustable, or adjustable only during the reception of special signals}
25/026	. . . {Arrangements for coupling transmitters, receivers or transceivers to transmission lines; Line drivers ( <a href="#">duplexing arrangements H04L 5/14</a> )}	25/03121	. . . . . . . {using a two-tap delay line}
25/0262	. . . {Arrangements for detecting the data rate of an incoming signal}	25/03127	. . . . . . . {using only passive components ( <a href="#">H04L 25/03121 takes precedence</a> )}
25/0264	. . . {Arrangements for coupling to transmission lines ( <a href="#">duplexing arrangements H04L 5/14</a> ; <a href="#">line equalisers</a> , <a href="#">line build-out devices H04L 25/03878</a> )}	25/03133	. . . . . . . {with a non-recursive structure ( <a href="#">H04L 25/03127 takes precedence</a> )}
25/0266	. . . . {Arrangements for providing Galvanic isolation, e.g. by means of magnetic or capacitive coupling}	25/0314	. . . . . . . {using fractionally spaced delay lines or combinations of fractionally integrally spaced taps}
25/0268	. . . . . {with modulation and subsequent demodulation}	25/03146	. . . . . . . {with a recursive structure ( <a href="#">H04L 25/03127 takes precedence</a> )}
25/027	. . . . . {specifically for telegraph signals ( <a href="#">induction coil interrupters H01H 51/34</a> ; <a href="#">dynamo-electric generators H02K</a> )}	25/03152	. . . . . . . {Theoretical aspects of non-adaptive time domain methods}
25/0272	. . . . {Arrangements for coupling to multiple lines, e.g. for differential transmission}		
25/0274	. . . . . {Arrangements for ensuring balanced coupling}		
25/0276	. . . . . {Arrangements for coupling common mode signals}		



25/03159 . . . .	{operating in the frequency domain ( <a href="#">H04L 25/03165</a> , <a href="#">H04L 25/03178</a> take precedence)}	25/03331 . . . .	{Arrangements for the joint estimation of multiple sequences}
25/03165 . . . .	{using neural networks}	25/03337 . . . .	{Arrangements involving per-survivor processing}
25/03171 . . . .	{Arrangements involving maximum a posteriori probability [MAP] detection}	25/03343 . . . .	{Arrangements at the transmitter end}
<b>NOTE</b>		2025/0335 . . . .	{characterised by the type of transmission}
{This group contains provisionally all documents which deal with turbo equalisation.}		2025/03356 . . . .	{Baseband transmission}
		2025/03363 . . . .	{Multilevel ( <a href="#">H04L 2025/03369</a> takes precedence)}
25/03178 . . . .	{Arrangements involving sequence estimation techniques}	2025/03369 . . . .	{Partial response}
25/03184 . . . .	{Details concerning the metric}	2025/03375 . . . .	{Passband transmission}
25/03191 . . . .	{in which the receiver makes a selection between different metrics}	2025/03382 . . . .	{Single of vestigial sideband}
25/03197 . . . .	{methods of calculation involving metrics}	2025/03388 . . . .	{ASK}
25/03203 . . . .	{Trellis search techniques}	2025/03394 . . . .	{FSK}
25/0321 . . . .	{Sorting arrangements therefor}	2025/03401 . . . .	{PSK}
25/03216 . . . .	{using the M-algorithm}	2025/03407 . . . .	{Continuous phase}
25/03222 . . . .	{using the T-algorithm}	2025/03414 . . . .	{Multicarrier}
25/03229 . . . .	{with state-reduction using grouping of states}	2025/0342 . . . .	{QAM}
25/03235 . . . .	{with state-reduction using feedback filtering}	2025/03426 . . . .	{transmission using multiple-input and multiple-output channels}
25/03242 . . . .	{Methods involving sphere decoding}	2025/03433 . . . .	{characterised by equaliser structure}
25/03248 . . . .	{Arrangements for operating in conjunction with other apparatus}	2025/03439 . . . .	{Fixed structures}
<b>NOTE</b>		2025/03445 . . . .	{Time domain}
{This group covers arrangements in which the sequence estimator is specially adapted to provide signals to, or receive signals from, the other apparatus. The group does not cover the mere juxtaposition of elements.}		2025/03452 . . . .	{Systolic arrays}
		2025/03458 . . . .	{Lattice}
		2025/03464 . . . .	{Neural networks}
		2025/03471 . . . .	{Tapped delay lines ( <a href="#">H04L 2025/03464</a> takes precedence)}
		2025/03477 . . . .	{not time-recursive}
		2025/03484 . . . .	{time-recursive}
		2025/0349 . . . .	{as a feedback filter}
		2025/03496 . . . .	{as a prediction filter}
		2025/03503 . . . .	{as a combination of feedback and prediction filters}
25/03254 . . . .	{Operation with other circuitry for removing intersymbol interference}	2025/03509 . . . .	{fractionally spaced ( <a href="#">H04L 2025/03515</a> takes precedence)}
25/03261 . . . .	{with impulse-response shortening filters}	2025/03515 . . . .	{irregularly spaced}
25/03267 . . . .	{with decision feedback equalisers}	2025/03522 . . . .	{Frequency domain}
25/03273 . . . .	{with carrier recovery circuitry}	2025/03528 . . . .	{Other transform domain}
25/0328 . . . .	{with interference cancellation circuitry ( <a href="#">adaptations for interference cancellation within a sequence estimator</a> <a href="#">H04L 25/03305</a> ; <a href="#">interference related aspects of direct sequence spread spectrum</a> <a href="#">H04B 1/7097</a> ; <a href="#">interference related aspects of frequency hopping spread spectrum</a> <a href="#">H04B 1/715</a> ; see also <a href="#">H04B 1/10</a> )}	2025/03535 . . . .	{Variable structures}
25/03286 . . . .	{with channel-decoding circuitry}	2025/03541 . . . .	{Switching between domains, e.g. between time and frequency}
25/03292 . . . .	{with channel estimation circuitry}	2025/03547 . . . .	{Switching between time domain structures}
25/03299 . . . .	{with noise-whitening circuitry}	2025/03554 . . . .	{between neural networks and tapped delay lines}
25/03305 . . . .	{Joint sequence estimation and interference removal ( <a href="#">joint detection of several desired signals</a> <a href="#">H04L 25/03331</a> )}	2025/0356 . . . .	{Switching the time direction of equalisation}
25/03312 . . . .	{Arrangements specific to the provision of output signals}	2025/03566 . . . .	{between different tapped delay line structures}
25/03318 . . . .	{Provision of soft decisions}	2025/03573 . . . .	{between recursive and non-recursive}
25/03324 . . . .	{Provision of tentative decisions}	2025/03579 . . . .	{Modifying the tap spacing}
		2025/03585 . . . .	{Modifying the length}
		2025/03592 . . . .	{Adaptation methods}
		2025/03598 . . . .	{Algorithms}
		2025/03605 . . . .	{Block algorithms}
		2025/03611 . . . .	{Iterative algorithms}
		2025/03617 . . . .	{Time recursive algorithms ( <a href="#">H04L 2025/03643</a> takes precedence)}

2025/03624	. . . . .	{Zero-forcing}	25/03904	. . . . .	{cooperative design, e.g. exchanging of codebook information between base stations}
2025/0363	. . . . .	{Feature restoration, e.g. constant modulus}	25/0391	. . . . .	{construction details of matrices}
2025/03636	. . . . .	{Algorithms using least mean square [LMS]}	25/03917	. . . . .	{according to the size of the codebook}
2025/03643	. . . . .	{Order recursive}	25/03923	. . . . .	{according to the rank}
2025/03649	. . . . .	{Algorithms using recursive least square [RLS]}	25/03929	. . . . .	{with layer mapping, e.g. codeword-to layer design (for space-time coding <a href="#">H04L 1/0618</a> )}
2025/03656	. . . . .	{Initialisation}	25/03936	. . . . .	{multi-resolution codebooks}
2025/03662	. . . . .	{to a fixed value}	25/03942	. . . . .	{switching between different codebooks}
2025/03668	. . . . .	{to the value at the end of a previous adaptation period}	25/03949	. . . . .	{equalizer selection or adaptation based on feedback (multiple signaling inclusive of a precoding command for adapting the transmitter <a href="#">H04L 1/0031</a> ; feedback for transmit diversity systems <a href="#">H04B 7/0619</a> ; selection of codebook or precoding matrix for MIMO diversity systems <a href="#">H04B 7/0456</a> )}
2025/03675	. . . . .	{Blind algorithms using gradient methods}	25/03955	. . . . .	{in combination with downlink estimations, e.g. downlink path losses}
2025/03681	. . . . .	{Control of adaptation}	25/03961	. . . . .	{design criteria}
2025/03687	. . . . .	{of step size}	25/03968	. . . . .	{mean-square error [MSE]}
2025/03694	. . . . .	{Stop and go}	25/03974	. . . . .	{throughput maximization}
2025/037	. . . . .	{Detection of convergence state}	25/0398	. . . . .	{Restoration of channel reciprocity}
2025/03707	. . . . .	{Detection or avoidance of local extrema}	25/03987	. . . . .	{Equalisation for sparse channels}
2025/03713	. . . . .	{Subspace algorithms}	25/03993	. . . . .	{Noise whitening}
2025/03719	. . . . .	{Super-exponential}	25/05	. . . . .	Electric or magnetic storage of signals before transmitting or retransmitting for changing the transmission rate
2025/03726	. . . . .	{Switching between algorithms}	25/06	. . . . .	DC level restoring means; Bias distortion correction {; Decision circuits providing symbol by symbol detection}
2025/03732	. . . . .	{according to the convergence state}	25/061	. . . . .	{providing hard decisions only; arrangements for tracking or suppressing unwanted low frequency components, e.g. removal of DC offset (removal of DC offset in coupling arrangements <a href="#">H04L 25/029</a> , <a href="#">H04L 25/0296</a> )}
2025/03738	. . . . .	{Manual adaptation}	25/062	. . . . .	{Setting decision thresholds using feedforward techniques only}
2025/03745	. . . . .	{Timing of adaptation}	25/063	. . . . .	{Setting decision thresholds using feedback techniques only}
2025/03751	. . . . .	{only once, at installation ( <a href="#">H04L 2025/03738</a> takes precedence)}	25/064	. . . . .	{Subtraction of the threshold from the signal, which is then compared to a supplementary fixed threshold}
2025/03757	. . . . .	{only on the request of a user}	25/065	. . . . .	{Binary decisions}
2025/03764	. . . . .	{only during predefined intervals}	25/066	. . . . .	{Multilevel decisions, not including self-organising maps}
2025/0377	. . . . .	{during the reception of training signals}	25/067	. . . . .	{providing soft decisions, i.e. decisions together with an estimate of reliability ( <a href="#">H04L 25/068</a> and <a href="#">H04L 25/069</a> take precedence; sequence estimation techniques <a href="#">H04L 25/03178</a> )}
2025/03777	. . . . .	{characterised by the signalling}	25/068	. . . . .	{by sampling faster than the nominal bit rate}
2025/03783	. . . . .	{Details of reference signals}	25/069	. . . . .	{by detecting edges or zero crossings}
2025/03789	. . . . .	{Codes therefore}	25/08	. . . . .	Modifications for reducing interference; Modifications for reducing effects due to line faults {; Receiver end arrangements for detecting or overcoming line faults}
2025/03796	. . . . .	{Location of reference signals}	25/085	. . . . .	{Arrangements for reducing interference in line transmission systems, e.g. by differential transmission}
2025/03802	. . . . .	{Signalling on the reverse channel}	25/10	. . . . .	Compensating for variations in line balance
2025/03808	. . . . .	{Transmission of equaliser coefficients}	25/12	. . . . .	Compensating for variations in line impedance
2025/03815	. . . . .	{Transmission of a training request}			
25/03821	. . . . .	{Inter-carrier interference cancellation [ICI]}			
25/03828	. . . . .	{Arrangements for spectral shaping; Arrangements for providing signals with specified spectral properties (partial response systems <a href="#">H04L 25/497</a> )}			
25/03834	. . . . .	{using pulse shaping}			
25/0384	. . . . .	{Design of pulse shapes (pulse shape for impulse radio <a href="#">H04B 1/7172</a> )}			
25/03847	. . . . .	{Shaping by selective switching of amplifying elements}			
25/03853	. . . . .	{Shaping by digital methods other than look up tables or up/down converters}			
25/03859	. . . . .	{shaping using look up tables for partial waveforms}			
25/03866	. . . . .	{using scrambling}			
25/03872	. . . . .	{Parallel scrambling or descrambling}			
25/03878	. . . . .	{Line equalisers; line build-out devices}			
25/03885	. . . . .	{adaptive}			
25/03891	. . . . .	{Spatial equalizers (MIMO diversity systems <a href="#">H04B 7/0413</a> )}			
25/03898	. . . . .	{codebook-based design (selection of codebook or precoding matrix for MIMO diversity systems <a href="#">H04B 7/0456</a> )}			

- 25/14 . . Channel dividing arrangements {, i.e. in which a single bit stream is divided between several baseband channels and reassembled at the receiver}
- 25/20 . . Repeater circuits; Relay circuits
- 25/202 . . . {using mechanical devices ([H04L 25/205 takes precedence](#))}
- 25/205 . . . {using tuning forks or vibrating reeds}
- 25/207 . . . {using electromagnetic switches}
- 25/22 . . . Repeaters for converting two wires to four wires; Repeaters for converting single current to double current
- 25/24 . . . Relay circuits using discharge tubes or semiconductor devices {([H04L 25/22 takes precedence](#))}
- 25/242 . . . . {with retiming}
- 25/245 . . . . {for start-stop signals (detection of start or stop bits [H04J 3/0602](#))}
- 25/247 . . . . {for synchronous signals}
- 25/26 . . . Circuits with optical sensing means {, i.e. using opto-couplers for isolation}
- 25/38 . Synchronous or start-stop systems, e.g. for Baudot code
- 25/40 . . Transmitting circuits; Receiving circuits {([repeater circuits, relay circuits H04L 25/20](#))}
- 25/42 . . . using mechanical distributors
- 25/44 . . . using relay distributors
- 25/45 . . . using electronic distributors
- 25/46 . . . using tuning forks or vibrating reeds
- 25/49 . . . using code conversion at the transmitter; using predistortion; using insertion of idle bits for obtaining a desired frequency spectrum; using three or more amplitude levels {; Baseband coding techniques specific to data transmission systems ([spectral shaping H04L 25/03828](#))}
- 25/4902 . . . . {Pulse width modulation; Pulse position modulation}
- 25/4904 . . . . {using self-synchronising codes, e.g. split-phase codes}
- 25/4906 . . . . {using binary codes}
- 25/4908 . . . . {using mBnB codes}
- 25/491 . . . . . {using 1B2B codes}
- 25/4912 . . . . . {using CMI or 2-HDB-3 code}
- 25/4915 . . . . . {using pattern inversion or substitution ([H04L 25/4908 takes precedence](#))}
- 25/4917 . . . . {using multilevel codes}
- 25/4919 . . . . {using balanced multilevel codes ([H04L 25/4927 takes precedence](#))}
- 25/4921 . . . . . {using quadrature encoding, e.g. carrierless amplitude-phase coding}
- 25/4923 . . . . . {using ternary codes ([H04L 25/4927 takes precedence](#))}
- 25/4925 . . . . . {using balanced bipolar ternary codes}
- 25/4927 . . . . . {using levels matched to the quantisation levels of the channel}
- 25/493 . . . . by transition coding, i.e. the time-position or direction of a transition being encoded before transmission
- 25/497 . . . . by correlative coding, e.g. partial response coding or echo modulation coding {transmitters and receivers for partial response systems ([transversal equalizers at the transmitter end H04L 25/03343](#))}
- 25/4975 . . . . . {Correlative coding using Tomlinson precoding, Harashima precoding, Trellis precoding or GPRS}
- 27/00 Modulated-carrier systems**
- 27/0002 . {analog front ends; means for connecting modulators, demodulators or transceivers to a transmission line ([duplex arrangements H04L 5/143](#))}
- 27/0004 . {using wavelets}
- 27/0006 . {Assessment of spectral gaps suitable for allocating digitally modulated signals, e.g. for carrier allocation in cognitive radio ([for spectrum sharing between different networks H04W 16/14](#))}
- 27/0008 . {arrangements for allowing a transmitter or receiver to use more than one type of modulation ([negotiating modulation type for two-way transmission paths H04L 5/1453](#))}
- 27/001 . {using chaotic signals ([for secret or secure communication H04L 9/001](#))}
- 27/0012 . {arrangements for identifying the type of modulation}
- 27/0014 . {Carrier regulation ([of chaotic carriers H04L 27/001](#); [for multicarrier receivers H04L 27/2657](#))}
- 27/0016 . . {Stabilisation of local oscillators}
- 27/0018 . . {Arrangements at the transmitter end}
- 27/002 . . . {using feedback from a remote receiver}
- 27/0022 . . . {using the carrier of the associated receiver of a transceiver}
- 27/0024 . . {at the receiver end}
- 27/0026 . . . {Correction of carrier offset}
- 27/0028 . . . . {at passband only}
- 27/003 . . . . {at baseband only}
- 27/0032 . . . . {at baseband and passband}
- 27/0034 . . . . {using hypothesis testing}
- 27/0036 . . . . {using a recovered symbol clock}
- 27/0038 . . . . {using an equaliser}
- 27/004 . . . . . {the equaliser providing control signals}
- 27/0042 . . . . . {the equaliser providing the offset correction [per se](#)}
- 27/0044 . . {Control loops for carrier regulation}
- 27/0046 . . . {Open loops}
- 27/0048 . . . . {Frequency multiplication}
- 27/0051 . . . . {Harmonic tracking}
- 27/0053 . . . {Closed loops}
- 27/0055 . . . . {single phase}
- 27/0057 . . . . {quadrature phase}
- 27/0059 . . . . {more than two phases}
- 27/0061 . . . . {remodulation}
- 27/0063 . . . {Elements of loops}
- 27/0065 . . . . {Frequency error detectors ([H04L 2027/0067 takes precedence](#))}
- 27/0067 . . . . {Phase error detectors}
- 27/0069 . . . . {Loop filters}
- 27/0071 . . . {Control of loops}
- 27/0073 . . . . {Detection of synchronisation state}
- 27/0075 . . . . {Error weighting}
- 27/0077 . . . . . {stop and go}
- 27/0079 . . . . {Switching between loops}
- 27/0081 . . . . . {between loops of different bandwidths}
- 27/0083 . . {Signalling arrangements}
- 27/0085 . . . {with no special signals for synchronisation}

2027/0087	. . . {Out-of-band signals, (e.g. pilots)}	27/2014	. . . . . {in which the phase changes in a piecewise linear manner during each symbol period, e.g. minimum shift keying, fast frequency shift keying ( <a href="#">H04L 27/201 takes precedence</a> )}
2027/0089	. . . {In-band signals}		
2027/0091	. . . . {Continuous signals}		
2027/0093	. . . . {Intermittant signals}		
2027/0095	. . . . . {in a preamble or similar structure}		
2027/0097	. . . {Adaptive synchronisation signals}	27/2017	. . . . . {in which the phase changes are non-linear, e.g. generalized and Gaussian minimum shift keying, tamed frequency modulation ( <a href="#">H04L 27/201 takes precedence</a> )}
27/01	. Equalisers {(baseband equalizers at the transmitter end <a href="#">H04L 25/03343</a> ; in analogue transmission systems <a href="#">H04B 3/04</a> , <a href="#">H04B 7/005</a> )}	27/2021	. . . . . {in which the phase change per symbol period is not constrained}
27/02	. Amplitude-modulated carrier systems, e.g. using on-off keying; Single sideband or vestigial sideband modulation ( <a href="#">H04L 27/32 takes precedence</a> )	27/2025	. . . . . {in which the phase changes in a piecewise linear manner within each symbol period}
27/04	. . Modulator circuits; Transmitter circuits	27/2028	. . . . . {in which the phase changes are non-linear}
27/06	. . Demodulator circuits; Receiver circuits	27/2032	. . . {for discrete phase modulation, e.g. in which the phase of the carrier is modulated in a nominally instantaneous manner}
27/063	. . . {Superheterodyne receivers}	27/2035	. . . . . {using a single or unspecified number of carriers}
27/066	. . . {Carrier recovery circuits ( <a href="#">H04L 27/2271 takes precedence</a> )}	27/2039	. . . . . {using microwave technology}
27/08	. . Amplitude regulation arrangements	27/2042	. . . . . {with more than two phase states}
27/10	. Frequency-modulated carrier systems, i.e. using frequency-shift keying ( <a href="#">H04L 27/32 takes precedence</a> )	27/2046	. . . . . {in which the data are represented by carrier phase}
27/103	. . {Chirp modulation (for spread spectrum techniques <a href="#">H04B 1/69</a> )}	27/205	. . . . . {in which the data are represented by the change in phase of the carrier}
27/106	. . {M-ary FSK}	27/2053	. . . . . {using more than one carrier, e.g. carriers with different phases}
27/12	. . Modulator circuits; Transmitter circuits	27/2057	. . . . . {with a separate carrier for each phase state}
27/122	. . . {using digital generation of carrier signals (digital function generators <a href="#">G06F 1/02</a> , <a href="#">H04L 17/10</a> ; generating pulses having stepped portions using digital techniques <a href="#">H03K 4/026</a> )}	27/206	. . . . . {using a pair of orthogonal carriers, e.g. quadrature carriers}
27/125	. . . {using a controlled oscillator in an open loop}	27/2064	. . . . . {using microwave technology}
27/127	. . . {using a controlled oscillator in a feedback loop}	27/2067	. . . . . {with more than two phase states ( <a href="#">H04L 27/2064 takes precedence</a> )}
27/14	. . Demodulator circuits; Receiver circuits	27/2071	. . . . . {in which the data are represented by the carrier phase, e.g. systems with differential coding}
27/142	. . . {Compensating direct current components occurring during the demodulation and which are caused by mistuning}	27/2075	. . . . . {in which the data are represented by the change in carrier phase}
27/144	. . . with demodulation using spectral properties of the received signal, e.g. by using frequency selective- or frequency sensitive elements	27/2078	. . . . . {in which the phase change per symbol period is constrained ( <a href="#">coset coding H04L 27/186</a> )}
27/148	. . . . using filters, including PLL-type filters	27/2082	. . . . . {for offset or staggered quadrature phase shift keying}
27/152	. . . . using controlled oscillators, e.g. PLL arrangements	27/2085	. . . . . {with more than one phase shift per symbol period}
27/1525	. . . . . {using quadrature demodulation}	27/2089	. . . . . {with unbalanced quadrature channels}
27/156	. . . with demodulation using temporal properties of the received signal, e.g. detecting pulse width	27/2092	. . . . . {with digital generation of the modulated carrier (does not include the modulation of a digitally generated carrier)}
27/1563	. . . . {using transition or level detection}	27/2096	. . . {Arrangements for directly or externally modulating an optical carrier ( <a href="#">optical modulation H04B 10/503</a> )}
27/1566	. . . . {using synchronous sampling}	27/22	. . Demodulator circuits; Receiver circuits
27/16	. . Frequency regulation arrangements	27/223	. . . {Demodulation in the optical domain ( <a href="#">optical demodulation H04B 10/676</a> )}
27/18	. Phase-modulated carrier systems, i.e. using phase-shift keying ( <a href="#">H04L 27/32 takes precedence</a> )	27/227	. . . using coherent demodulation
27/183	. . {Multiresolution systems}	27/2271	. . . . {wherein the carrier recovery circuit uses only the demodulated signals}
27/186	. . {in which the information is carried by both the individual signal points and the subset to which the individual signal points belong, e.g. coset coding or related schemes}		
27/20	. . Modulator circuits; Transmitter circuits		
27/2003	. . . {for continuous phase modulation ( <a href="#">frequency shift keying H04L 27/10</a> )}		
27/2007	. . . . {in which the phase change within each symbol period is constrained ( <a href="#">coset coding H04L 27/186</a> )}		
27/201	. . . . . {in which the allowed phase changes vary with time, e.g. multi-h modulation}		



27/2272	. . . . . {using phase locked loops ( <a href="#">H04L 27/2273 takes precedence</a> )}	27/2624	. . . . . {by soft clipping}
27/2273	. . . . . {associated with quadrature demodulation, e.g. Costas loop}	27/2626	. . . {Arrangements specific to the transmitter only}
27/2275	. . . . . {wherein the carrier recovery circuit uses the received modulated signals}	27/26265	. . . . . {Arrangements for sidelobes suppression specially adapted to multicarrier systems, e.g. spectral precoding}
27/2276	. . . . . {using frequency multiplication or harmonic tracking}	27/2627	. . . . . {Modulators}
27/2277	. . . . . {using remodulation}	27/2628	. . . . . {Inverse Fourier transform modulators, e.g. inverse fast Fourier transform [IFFT] or inverse discrete Fourier transform [IDFT] modulators ( <a href="#">H04L 27/2634 takes precedence</a> )}
27/2278	. . . . . {using correlation techniques, e.g. for spread spectrum signals}	27/263	. . . . . {modification of IFFT/IDFT modulator for performance improvement}
27/233	. . . using non-coherent demodulation	27/2631	. . . . . {with polyphase implementation}
27/2331	. . . . . {wherein the received signal is demodulated using one or more delayed versions of itself}	27/2633	. . . . . {using partial FFTs}
27/2332	. . . . . {using a non-coherent carrier}	27/2634	. . . . . {Inverse fast Fourier transform [IFFT] or inverse discrete Fourier transform [IDFT] modulators in combination with other circuits for modulation}
27/2334	. . . . . {using filters}	27/2636	. . . . . {with FFT or DFT modulators, e.g. standard single-carrier frequency-division multiple access [SC-FDMA] transmitter or DFT spread orthogonal frequency division multiplexing [DFT-SOFDM]}
27/2335	. . . . . {using temporal properties of the received signal}	27/26362	. . . . . {Subcarrier weighting equivalent to time domain filtering, e.g. weighting per subcarrier multiplication ( <a href="#">arrangements for removing intersymbol interference at the transmitter end H04L 25/03343</a> )}
27/2337	. . . . . {using digital techniques to measure the time between zero-crossings}	27/2637	. . . . . {with direct modulation of individual subcarriers}
27/2338	. . . . . {using sampling ( <a href="#">H04L 27/2331 - H04L 27/2335 take precedence</a> )}	27/2639	. . . . . {Modulators using other transforms, e.g. discrete cosine transforms, Orthogonal Time Frequency and Space [OTFS] or hermetic transforms}
27/24	. . Half-wave signalling systems	27/264	. . . . . {Pulse-shaped multi-carrier, i.e. not using rectangular window}
27/26	. Systems using multi-frequency codes ( <a href="#">H04L 27/32 takes precedence</a> )	27/26412	. . . . . {Filtering over the entire frequency band, e.g. filtered orthogonal frequency-division multiplexing [OFDM]}
27/2601	. . {Multicarrier modulation systems}	27/26414	. . . . . {Filtering per subband or per resource block, e.g. universal filtered multicarrier [UFMC] or generalized frequency division multiplexing [GFDM]}
27/2602	. . . {Signal structure}	27/26416	. . . . . {Filtering per subcarrier, e.g. filterbank multicarrier [FBMC]}
27/26025	. . . . . {Numerology, i.e. varying one or more of symbol duration, subcarrier spacing, Fourier transform size, sampling rate or down-clocking ( <a href="#">allocating sub-channels of the transmission path H04L 5/003</a> )}	27/2642	. . . . . {Wavelet transform modulators ( <a href="#">wavelet-division H04L 5/0008</a> )}
27/2603	. . . . . {Signal structure ensuring backward compatibility with legacy system}	27/2643	. . . . . {using symbol repetition, e.g. time domain realization of distributed FDMA}
27/26035	. . . . . {Maintenance of orthogonality, e.g. for signals exchanged between cells or users, or by using covering codes or sequences ( <a href="#">using different training sequence per antenna H04B 7/0684; code allocation H04J 13/16</a> )}	27/2644	. . . . . {with oversampling}
27/2604	. . . . . {Multiresolution systems ( <a href="#">by means of multiresolution subcarriers H04L 27/183, H04L 27/3488</a> )}	27/2646	. . . . . {using feedback from receiver for adjusting OFDM transmission parameters, e.g. transmission timing or guard interval length}
27/2605	. . . . . {Symbol extensions, e.g. Zero Tail, Unique Word [UW]}	27/2647	. . . {Arrangements specific to the receiver only ( <a href="#">equalisation H04L 27/01</a> )}
27/2607	. . . . . {Cyclic extensions}	27/2649	. . . . . {Demodulators}
27/261	. . . . . {Details of reference signals}	27/265	. . . . . {Fourier transform demodulators, e.g. fast Fourier transform [FFT] or discrete Fourier transform [DFT] demodulators ( <a href="#">H04L 27/26524 takes precedence</a> )}
27/2613	. . . . . {Structure of the reference signals}		
27/26132	. . . . . {using repetition}		
27/26134	. . . . . {Pilot insertion in the transmitter chain, e.g. pilot overlapping with data, insertion in time or frequency domain}		
27/26136	. . . . . {Pilot sequence conveying additional information}		
27/2614	. . . {Peak power aspects}		
27/2615	. . . . . {Reduction thereof using coding}		
27/2617	. . . . . {using block codes}		
27/2618	. . . . . {Reduction thereof using auxiliary subcarriers}		
27/262	. . . . . {Reduction thereof by selection of pilot symbols}		
27/2621	. . . . . {Reduction thereof using phase offsets between subcarriers}		
27/2623	. . . . . {Reduction thereof by clipping}		

27/2651	. . . . .	{Modification of fast Fourier transform [FFT] or discrete Fourier transform [DFT] demodulators for performance improvement}	27/2675	. . . . .	{Pilot or known symbols}
27/2652	. . . . .	{with polyphase implementation}	27/2676	. . . . .	{Blind, i.e. without using known symbols}
27/26522	. . . . .	{using partial FFTs}	27/2678	. . . . .	{using cyclostationarities, e.g. cyclic prefix or postfix}
27/26524	. . . . .	{Fast Fourier transform [FFT] or discrete Fourier transform [DFT] demodulators in combination with other circuits for demodulation}	27/2679	. . . . .	{Decision-aided}
27/26526	. . . . .	{with inverse FFT [IFFT] or inverse DFT [IDFT] demodulators, e.g. standard single-carrier frequency-division multiple access [SC-FDMA] receiver or DFT spread orthogonal frequency division multiplexing [DFT-SOFDM]}	27/2681	. . . . .	{characterised by constraints}
27/2653	. . . . .	{with direct demodulation of individual subcarriers}	27/2682	. . . . .	{Precision}
27/26532	. . . . .	{Demodulators using other transforms, e.g. discrete cosine transforms, Orthogonal Time Frequency and Space [OTFS] or hermetic transforms}	27/2684	. . . . .	{Complexity}
27/26534	. . . . .	{Pulse-shaped multi-carrier, i.e. not using rectangular window}	27/2685	. . . . .	{Speed of convergence}
27/26536	. . . . .	{Filtering over the entire frequency band, e.g. filtered orthogonal frequency division multiplexing [OFDM]}	27/2686	. . . . .	{Range of frequencies or delays tested}
27/26538	. . . . .	{Filtering per subband or per resource block, e.g. universal filtered multicarrier [UFMC] or generalized frequency division multiplexing [GFDM]}	27/2688	. . . . .	{Resistance to perturbation, e.g. noise, interference or fading}
27/2654	. . . . .	{Filtering per subcarrier, e.g. filterbank multicarrier [FBMC]}	27/26885	. . . . .	{Adaptation to rapid radio propagation changes, e.g. due to velocity}
27/26542	. . . . .	{Wavelet transform demodulators ( <a href="#">wavelet-division H04L 5/0008</a> )}	27/2689	. . . . .	{Link with other circuits, i.e. special connections between synchronisation arrangements and other circuits for achieving synchronisation}
27/26544	. . . . .	{Demodulators for signals generated by symbol repetition ( <a href="#">synchronisation arrangements H04L 27/2655</a> )}	27/2691	. . . . .	{involving interference determination or cancellation}
27/26546	. . . . .	{with oversampling}	27/2692	. . . . .	{with preamble design, i.e. with negotiation of the synchronisation sequence with transmitter or sequence linked to the algorithm used at the receiver}
27/2655	. . . . .	{Synchronisation arrangements}	27/2694	. . . . .	{adaptive design}
27/2656	. . . . .	{Frame synchronisation, e.g. packet synchronisation, time division duplex [TDD] switching point detection or subframe synchronisation}	27/2695	. . . . .	{with channel estimation, e.g. determination of delay spread, derivative or peak tracking ( <a href="#">channel estimation H04L 25/0202</a> )}
27/2657	. . . . .	{Carrier synchronisation}	27/2697	. . . . .	{in combination with other modulation techniques}
27/2659	. . . . .	{Coarse or integer frequency offset determination and synchronisation}	27/2698	. . . . .	{double density OFDM/OQAM system, e.g. OFDM/OQAM-IOTA system}
27/266	. . . . .	{Fine or fractional frequency offset determination and synchronisation}	27/28	. . . . .	with simultaneous transmission of different frequencies each representing one code element
27/2662	. . . . .	{Symbol synchronisation}	27/30	. . . . .	wherein each code element is represented by a combination of frequencies
27/2663	. . . . .	{Coarse synchronisation, e.g. by correlation}	27/32	. . . . .	Carrier systems characterised by combinations of two or more of the types covered by groups <a href="#">H04L 27/02</a> , <a href="#">H04L 27/10</a> , <a href="#">H04L 27/18</a> or <a href="#">H04L 27/26</a>
27/2665	. . . . .	{Fine synchronisation, e.g. by positioning the FFT window}	27/34	. . . . .	Amplitude- and phase-modulated carrier systems, e.g. quadrature-amplitude modulated carrier systems
27/2666	. . . . .	{Acquisition of further OFDM parameters, e.g. bandwidth, subcarrier spacing, or guard interval length}	27/3405	. . . . .	{Modifications of the signal space to increase the efficiency of transmission, e.g. reduction of the bit error rate, bandwidth, or average power}
27/2668	. . . . .	{Details of algorithms}	27/3411	. . . . .	{reducing the peak to average power ratio or the mean power of the constellation; Arrangements for increasing the shape gain of a signal set}
27/2669	. . . . .	{characterised by the domain of operation}	27/3416	. . . . .	{in which the information is carried by both the individual signal points and the subset to which the individual points belong, e.g. using coset coding, lattice coding, or related schemes}
27/2671	. . . . .	{Time domain}	27/3422	. . . . .	{in which the constellation is not the n - fold Cartesian product of a single underlying two-dimensional constellation}
27/2672	. . . . .	{Frequency domain}			
27/2673	. . . . .	{characterised by synchronisation parameters}			

27/3427	. . . . .	{in which the constellation is the n - fold Cartesian product of a single underlying two-dimensional constellation}	27/3836	. . . . .	{in which the carrier is recovered using the received modulated signal or the received IF signal, e.g. by detecting a pilot or by frequency multiplication}
27/3433	. . . . .	{using an underlying square constellation}	27/3845	. . . . .	{using non - coherent demodulation, i.e. not using a phase synchronous carrier}
27/3438	. . . . .	{using an underlying generalised cross constellation}	27/3854	. . . . .	{using a non - coherent carrier, including systems with baseband correction for phase or frequency offset}
27/3444	. . . . .	{by applying a certain rotation to regular constellations}	27/3863	. . . . .	{Compensation for quadrature error in the received signal}
27/345	. . . . .	{Modifications of the signal space to allow the transmission of additional information}	27/3872	. . . . .	{Compensation for phase rotation in the demodulated signal}
27/3455	. . . . .	{in order to facilitate carrier recovery at the receiver end, e.g. by transmitting a pilot or by using additional signal points to allow the detection of rotations}	27/3881	. . . . .	{using sampling and digital processing, not including digital systems which imitate heterodyne or homodyne demodulation}
27/3461	. . . . .	{in order to transmit a subchannel}	27/389	. . . . .	{with separate demodulation for the phase and amplitude components}
27/3466	. . . . .	{by providing an alternative to one signal point}	<b>41/00</b>		<b>Arrangements for maintenance, administration or management of data switching networks, e.g. of packet switching networks</b>
27/3472	. . . . .	{by switching between alternative constellations}	41/02	. . . . .	Standardisation; Integration
27/3477	. . . . .	{by using the outer points of the constellation or of the constituent two-dimensional constellations}	41/0213	. . . . .	Standardised network management protocols, e.g. simple network management protocol [SNMP]
27/3483	. . . . .	{using a modulation of the constellation points}	41/022	. . . . .	Multivendor or multi-standard integration
27/3488	. . . . .	{Multiresolution systems}	41/0226	. . . . .	Mapping or translating multiple network management protocols
27/3494	. . . . .	{using non - square modulating pulses, e.g. using raised cosine pulses; Partial response QAM, i.e. with partial response pulse shaping ( <a href="#">QAM over partial response channels H04L 25/497</a> )}	41/0233	. . . . .	Object-oriented techniques, for representation of network management data, e.g. common object request broker architecture [CORBA]
27/36	. . . . .	Modulator circuits; Transmitter circuits	41/024	. . . . .	{using relational databases for representation of network management data, e.g. managing via structured query language [SQL]}
27/361	. . . . .	{Modulation using a single or unspecified number of carriers, e.g. with separate stages of phase and amplitude modulation}	41/0246	. . . . .	Exchanging or transporting network management information using the Internet; Embedding network management web servers in network elements; Web-services-based protocols
27/362	. . . . .	{Modulation using more than one carrier, e.g. with quadrature carriers, separately amplitude modulated ( <a href="#">H04L 27/366 takes precedence</a> )}	41/0253	. . . . .	using browsers or web-pages for accessing management information
27/363	. . . . .	{using non - square modulating pulses, modulators specifically designed for this (transmission of non - square QAM <a href="#">H04L 27/3494</a> )}	41/026	. . . . .	using e-messaging for transporting management information, e.g. email, instant messaging or chat
27/364	. . . . .	{Arrangements for overcoming imperfections in the modulator, e.g. quadrature error or unbalanced I and Q levels}	41/0266	. . . . .	using meta-data, objects or commands for formatting management information, e.g. using eXtensible markup language [XML]
27/365	. . . . .	{Modulation using digital generation of the modulated carrier (not including modulation of a digitally generated carrier)}	41/0273	. . . . .	using web services for network management, e.g. simple object access protocol [SOAP]
27/366	. . . . .	{Arrangements for compensating undesirable properties of the transmission path between the modulator and the demodulator}	41/028	. . . . .	{for synchronisation between service call and response}
27/367	. . . . .	{using predistortion}	41/0286	. . . . .	{for search or classification or discovery of web services providing management functionalities}
27/368	. . . . .	{adaptive predistortion}	41/0293	. . . . .	{for accessing web services by means of a binding identification of the management service or element}
27/38	. . . . .	Demodulator circuits; Receiver circuits	41/04	. . . . .	Network management architectures or arrangements
27/3809	. . . . .	{Amplitude regulation arrangements}	41/042	. . . . .	comprising distributed management centres cooperatively managing the network
27/3818	. . . . .	{using coherent demodulation, i.e. using one or more nominally phase synchronous carriers ( <a href="#">H04L 27/227</a> and <a href="#">H04L 27/389 take precedence</a> )}	41/044	. . . . .	comprising hierarchical management structures
27/3827	. . . . .	{in which the carrier is recovered using only the demodulated baseband signals}	41/045	. . . . .	comprising client-server management architectures
			41/046	. . . . .	comprising network management agents or mobile agents therefor
			41/048	. . . . .	{mobile agents}

- 41/052 . . using standardised network management architectures, e.g. telecommunication management network [TMN] or unified network management architecture [UNMA]
- 41/06 . Management of faults, events, alarms or notifications
- 41/0604 . . using filtering, e.g. reduction of information by using priority, element types, position or time
- 41/0609 . . . {based on severity or priority}
- 41/0613 . . . {based on the type or category of the network elements}
- 41/0618 . . . {based on the physical or logical position}
- 41/0622 . . . {based on time}
- 41/0627 . . . {by acting on the notification or alarm source}
- 41/0631 . . using root cause analysis; using analysis of correlation between notifications, alarms or events based on decision criteria, e.g. hierarchy, tree or time analysis
- 41/0636 . . . {based on a decision tree analysis}
- 41/064 . . . {involving time analysis}
- 41/0645 . . . {by additionally acting on or stimulating the network after receiving notifications}
- 41/065 . . . {involving logical or physical relationship, e.g. grouping and hierarchies}
- 41/0654 . . using network fault recovery (ring fault isolation or reconfiguration in loop networks without recovery actions by a network management system [H04L 12/437](#))
- 41/0659 . . . by isolating or reconfiguring faulty entities
- 41/0661 . . . . {by reconfiguring faulty entities}
- 41/0663 . . . Performing the actions predefined by failover planning, e.g. switching to standby network elements
- 41/0668 . . . by dynamic selection of recovery network elements, e.g. replacement by the most appropriate element after failure
- 41/0677 . . Localisation of faults
- 41/0681 . . Configuration of triggering conditions
- 41/0686 . . Additional information in the notification, e.g. enhancement of specific meta-data
- 41/069 . . using logs of notifications; Post-processing of notifications
- 41/0695 . . the faulty arrangement being the maintenance, administration or management system
- 41/08 . Configuration management of networks or network elements ([address allocation H04L 61/50](#))
- 41/0803 . . Configuration setting
- 41/0806 . . . for initial configuration or provisioning, e.g. plug-and-play
- 41/0809 . . . . {Plug-and-play configuration}
- 41/0813 . . . characterised by the conditions triggering a change of settings
- 41/0816 . . . . the condition being an adaptation, e.g. in response to network events
- 41/082 . . . . the condition being updates or upgrades of network functionality
- 41/0823 . . . characterised by the purposes of a change of settings, e.g. optimising configuration for enhancing reliability ([for optimising operational conditions of wireless networks H04W 24/02](#))
- 41/0826 . . . . for reduction of network costs ([H04L 41/0833 takes precedence](#))
- 41/083 . . . . for increasing network speed
- 41/0833 . . . . for reduction of network energy consumption
- 41/0836 . . . . {to enhance reliability, e.g. reduce downtime}
- 41/084 . . . Configuration by using pre-existing information, e.g. using templates or copying from other elements
- 41/0843 . . . . {based on generic templates}
- 41/0846 . . . . {based on copy from other elements}
- 41/085 . . Retrieval of network configuration; Tracking network configuration history
- 41/0853 . . . by actively collecting configuration information or by backing up configuration information
- 41/0856 . . . . {by backing up or archiving configuration information}
- 41/0859 . . . by keeping history of different configuration generations or by rolling back to previous configuration versions
- 41/0863 . . . . {by rolling back to previous configuration versions}
- 41/0866 . . Checking the configuration
- 41/0869 . . . Validating the configuration within one network element
- 41/0873 . . . Checking configuration conflicts between network elements
- 41/0876 . . {Aspects of the degree of configuration automation}
- 41/0879 . . . . {Manual configuration through operator}
- 41/0883 . . . . {Semiautomatic configuration, e.g. proposals from system}
- 41/0886 . . . . {Fully automatic configuration}
- 41/0889 . . {Techniques to speed-up the configuration process}
- 41/0893 . . Assignment of logical groups to network elements
- 41/0894 . . Policy-based network configuration management
- 41/0895 . . Configuration of virtualised networks or elements, e.g. virtualised network function or OpenFlow elements
- 41/0896 . . Bandwidth or capacity management, i.e. automatically increasing or decreasing capacities ([flow or congestion control using dynamic resource allocation, e.g. in-call renegotiation, H04L 47/76](#))
- 41/0897 . . . by horizontal or vertical scaling of resources, or by migrating entities, e.g. virtual resources or entities
- 41/12 . Discovery or management of network topologies
- 41/122 . . of virtualised topologies, e.g. software-defined networks [SDN] or network function virtualisation [NFV]
- 41/14 . Network analysis or design
- 41/142 . . using statistical or mathematical methods
- 41/145 . . {involving simulating, designing, planning or modelling of a network}
- 41/147 . . for predicting network behaviour
- 41/149 . . for prediction of maintenance
- 41/16 . using machine learning or artificial intelligence
- 41/18 . Delegation of network management function, e.g. customer network management [CNM]
- 41/20 . {Network management software packages}
- 41/22 . comprising specially adapted graphical user interfaces [GUI]
- 41/24 . {using dedicated network management hardware}



41/26	. {using dedicated tools for LAN [Local Area Network] management}	41/5077	. . {wherein the managed service relates to simple transport services, i.e. providing only network infrastructure}
41/28	. Restricting access to network management systems or functions, e.g. using authorisation function to access network configuration	41/508	. . {based on type of value added network service under agreement}
41/30	. {Decision processes by autonomous network management units using voting and bidding}	41/5083	. . . {wherein the managed service relates to web hosting}
41/32	. {Specific management aspects for broadband networks}	41/5087	. . . {wherein the managed service relates to voice services (management of VoIP services H04M 7/0081)}
41/34	. Signalling channels for network management communication	41/509	. . . {wherein the managed service relates to media content delivery, e.g. audio, video or TV}
41/342	. . between virtual entities, e.g. orchestrators, SDN or NFV entities	41/5093	. . . {wherein the managed service relates to messaging or chat services}
41/344	. . Out-of-band transfers	41/5096	. . . {wherein the managed service relates to distributed or central networked applications}
41/40	. using virtualisation of network functions or resources, e.g. SDN or NFV entities		
41/50	. Network service management, e.g. ensuring proper service fulfilment according to agreements	<b>43/00</b>	<b>Arrangements for monitoring or testing data switching networks</b>
41/5003	. . Managing SLA; Interaction between SLA and QoS	43/02	. Capturing of monitoring data
41/5006	. . . Creating or negotiating SLA contracts, guarantees or penalties	43/022	. . by sampling
41/5009	. . . Determining service level performance parameters or violations of service level contracts, e.g. violations of agreed response time or mean time between failures [MTBF]	43/024	. . . by adaptive sampling
41/5012	. . . . {determining service availability, e.g. which services are available at a certain point in time}	43/026	. . using flow identification
41/5016	. . . . . {based on statistics of service availability, e.g. in percentage or over a given time}	43/028	. . by filtering
41/5019	. . . Ensuring fulfilment of SLA	43/04	. Processing captured monitoring data, e.g. for logfile generation
41/5022	. . . . by giving priorities, e.g. assigning classes of service	43/045	. . for graphical visualisation of monitoring data
41/5025	. . . . by proactively reacting to service quality change, e.g. by reconfiguration after service quality degradation or upgrade	43/06	. Generation of reports
41/5029	. . {Service quality level-based billing, e.g. dependent on measured service level customer is charged more or less}	43/062	. . related to network traffic
41/5032	. . {Generating service level reports}	43/065	. . related to network devices
41/5041	. . characterised by the time relationship between creation and deployment of a service	43/067	. . using time frame reporting
41/5045	. . . {Making service definitions prior to deployment}	43/08	. Monitoring or testing based on specific metrics, e.g. QoS, energy consumption or environmental parameters
41/5048	. . . {Automatic or semi-automatic definitions, e.g. definition templates}	43/0805	. . by checking availability
41/5051	. . . Service on demand, e.g. definition and deployment of services in real time	43/0811	. . . by checking connectivity
41/5054	. . . Automatic deployment of services triggered by the service manager, e.g. service implementation by automatic configuration of network components	43/0817	. . . by checking functioning
41/5058	. . {Service discovery by the service manager}	43/0823	. . Errors, e.g. transmission errors
41/5061	. . characterised by the interaction between service providers and their network customers, e.g. customer relationship management	43/0829	. . . Packet loss
41/5064	. . . {Customer relationship management}	43/0835	. . . . {One way packet loss}
41/5067	. . . Customer-centric QoS measurements	43/0841	. . . . {Round trip packet loss}
41/507	. . . Filtering out customers affected by service problems	43/0847	. . . {Transmission error}
41/5074	. . . Handling of user complaints or trouble tickets	43/0852	. . Delays
		43/0858	. . . {One way delays}
		43/0864	. . . Round trip delays
		43/087	. . . Jitter
		43/0876	. . Network utilisation, e.g. volume of load or congestion level
		43/0882	. . . Utilisation of link capacity
		43/0888	. . . Throughput
		43/0894	. . . Packet rate
		43/091	. . Measuring contribution of individual network components to actual service level
		43/10	. Active monitoring, e.g. heartbeat, ping or trace-route
		43/103	. . with adaptive polling, i.e. dynamically adapting the polling rate
		43/106	. . using time related information in packets, e.g. by adding timestamps
		43/12	. Network monitoring probes
		43/14	. {using software, i.e. software packages (network security related monitoring H04L 63/1408)}
		43/16	. Threshold monitoring

43/18	• Protocol analysers	45/306	• • {Route determination based on the nature of the carried application}
43/20	• the monitoring system or the monitored elements being virtualised, abstracted or software-defined entities, e.g. SDN or NFV	45/3065	• • • {for real time traffic}
43/50	• Testing arrangements	45/308	• • {Route determination based on user's profile, e.g. premium users}
43/55	• • Testing of service level quality, e.g. simulating service usage	45/32	• {Flooding (denial of service attacks <a href="#">H04L 63/1458</a> )}
<b>45/00</b>	<b>Routing or path finding of packets in data switching networks (routing or path finding in wireless networks <a href="#">H04W 40/00</a>)</b>	45/34	• {Source routing}
45/02	• Topology update or discovery	45/36	• {Backward learning}
45/021	• • Ensuring consistency of routing table updates, e.g. by using epoch numbers	45/38	• {Flow based routing}
45/023	• • Delayed use of routing table updates	45/40	• {Wormhole routing}
45/025	• • {Updating only a limited number of routers, e.g. fish-eye update}	45/42	• Centralised routing
45/026	• • {Details of "hello" or keep-alive messages}	45/44	• Distributed routing
45/028	• • Dynamic adaptation of the update intervals, e.g. event-triggered updates	45/46	• {Cluster building}
45/03	• • by updating link state protocols	45/48	• Routing tree calculation
45/033	• • by updating distance vector protocols	45/484	• • using multiple routing trees
45/036	• • Updating the topology between route computation elements, e.g. between OpenFlow controllers	45/488	• • using root node determination
45/037	• • • Routes obligatorily traversing service-related nodes	45/50	• using label swapping, e.g. multi-protocol label switch [MPLS]
45/0377	• • • • for service chaining	45/502	• • {Frame based}
45/04	• • {Interdomain routing, e.g. hierarchical routing}	45/505	• • {Cell based}
45/06	• • {Deflection routing, e.g. hot-potato routing}	45/507	• • {Label distribution}
45/08	• • {Learning-based routing, e.g. using neural networks or artificial intelligence}	45/52	• Multiprotocol routers
45/10	• • {Routing in connection-oriented networks, e.g. X.25 or ATM}	45/54	• {Organization of routing tables}
45/12	• Shortest path evaluation	45/56	• {Routing software}
45/121	• • by minimising delays	45/563	• • {Software download or update}
45/122	• • by minimising distances, e.g. by selecting a route with minimum of number of hops	45/566	• • {Routing instructions carried by the data packet, e.g. active networks}
45/123	• • {Evaluation of link metrics (techniques for monitoring network metrics <a href="#">H04L 43/08</a> )}	45/58	• Association of routers
45/124	• • {using a combination of metrics}	45/583	• • {Stackable routers}
45/125	• • based on throughput or bandwidth	45/586	• • of virtual routers
45/126	• • {minimising geographical or physical path length}	45/60	• Router architectures
45/127	• • {based on intermediate node capabilities}	45/62	• {Wavelength based (optical switching <a href="#">H04Q 11/0062</a> )}
45/128	• • for finding disjoint paths	45/64	• using an overlay routing layer
45/1283	• • • {with disjoint links}	45/645	• Splitting route computation layer and forwarding layer, e.g. routing according to path computational element [PCE] or based on OpenFlow functionality
45/1287	• • • {with disjoint nodes}	45/655	• • Interaction between route computation entities and forwarding entities, e.g. for route determination or for flow table update
45/14	• {Routing performance; Theoretical aspects}	45/66	• {Layer 2 routing, e.g. in Ethernet based MAN's}
45/16	• Multipoint routing	45/68	• {Pseudowire emulation, e.g. IETF WG PWE3}
45/17	• Shortcut routing, e.g. using next hop resolution protocol [NHRP]	45/70	• {Routing based on monitoring results}
45/18	• Loop-free operations	45/72	• {Routing based on the source address}
45/20	• {Hop count for routing purposes, e.g. TTL}	45/74	• Address processing for routing
45/22	• {Alternate routing}	45/741	• • Routing in networks with a plurality of addressing schemes, e.g. with both IPv4 and IPv6
45/24	• Multipath	45/742	• • {Route cache; Operation thereof}
45/243	• • using M+N parallel active paths	45/745	• • Address table lookup; Address filtering
45/245	• • {Link aggregation, e.g. trunking}	45/7452	• • • Multiple parallel or consecutive lookup operations (lookup operation involving Bloom filters <a href="#">H04L 45/7459</a> )
45/247	• • using M:N active or standby paths	45/7453	• • • using hashing
45/26	• {Route discovery packet}	45/7459	• • • • using Bloom filters
45/28	• using route fault recovery	45/74591	• • • • {using content-addressable memories [CAM]}
45/30	• Routing of multiclass traffic	45/748	• • • using longest matching prefix
45/302	• Route determination based on requested QoS	45/76	• Routing in software-defined topologies, e.g. routing between virtual machines
45/304	• • {Route determination for signalling traffic}	45/80	• Ingress point selection by the source endpoint, e.g. selection of ISP or POP
		45/85	• • Selection among different networks

45/851	. . . Dynamic network selection or re-selection, e.g. after degradation of quality	47/2491	. . . Mapping quality of service [QoS] requirements between different networks
<b>47/00</b>	<b>Traffic control in data switching networks</b> (arrangements for detecting or preventing errors in the information received <a href="#">H04L 1/00</a> )	47/25	. . with rate being modified by the source upon detecting a change of network conditions
	<b>NOTE</b>	47/26	. . using explicit feedback to the source, e.g. choke packets
	This group covers:	47/263	. . . Rate modification at the source after receiving feedback
	1. Flow control or congestion control	47/265	. . . sent by intermediate network nodes
	2. Queue scheduling	47/266	. . . {Stopping or restarting the source, e.g. X-on or X-off}
	3. Admission control or resource allocation	47/267	. . . sent by the destination endpoint (network streaming of media packets with control of the source by the destination <a href="#">H04L 65/613</a> )
47/10	. Flow control; Congestion control	47/27	. . Evaluation or update of window size, e.g. using information derived from acknowledged [ACK] packets
47/11	. . Identifying congestion	47/28	. . in relation to timing considerations
47/115	. . . {using a dedicated packet}	47/283	. . . in response to processing delays, e.g. caused by jitter or round trip time [RTT]
47/12	. . Avoiding congestion; Recovering from congestion	47/286	. . . {Time to live}
47/122	. . . by diverting traffic away from congested entities	47/29	. . {using a combination of thresholds}
47/125	. . . by balancing the load, e.g. traffic engineering	47/30	. . in combination with information about buffer occupancy at either end or at transit nodes
47/127	. . . by using congestion prediction	47/31	. . by tagging of packets, e.g. using discard eligibility [DE] bits
47/129	. . . at the destination endpoint, e.g. reservation of terminal resources or buffer space	47/32	. . by discarding or delaying data units, e.g. packets or frames
47/13	. . {in a LAN segment, e.g. ring or bus}	47/323	. . . {Discarding or blocking control packets, e.g. ACK packets}
47/135	. . . {by jamming the transmission media}	47/326	. . . {with random discard, e.g. random early discard [RED]}
47/15	. . {in relation to multipoint traffic (arrangements for broadcast or multicast in data networks <a href="#">H04L 12/18</a> )}	47/33	. . using forward notification
47/16	. . {in connection oriented networks, e.g. frame relay}	47/34	. . ensuring sequence integrity, e.g. using sequence numbers
47/17	. . Interaction among intermediate nodes, e.g. hop by hop	47/35	. . by embedding flow control information in regular packets, e.g. piggybacking
47/18	. . {End to end}	47/36	. . by determining packet size, e.g. maximum transfer unit [MTU]
47/19	. . at layers above the network layer (network arrangements for networked applications for scheduling or organising the servicing of application requests <a href="#">H04L 67/60</a> )	47/365	. . . {Dynamic adaptation of the packet size}
47/193	. . . at the transport layer, e.g. TCP related	47/37	. . {Slow start}
47/196	. . . {Integration of transport layer protocols, e.g. TCP and UDP}	47/38	. . by adapting coding or compression rate
47/20	. . Traffic policing	47/39	. . {Credit based}
47/21	. . using leaky-bucket	47/40	. . using split connections
47/215	. . using token-bucket	47/41	. . by acting on aggregated flows or links
47/22	. . Traffic shaping	47/43	. . Assembling or disassembling of packets, e.g. segmentation and reassembly [SAR]
47/225	. . . {Determination of shaping rate, e.g. using a moving window}	47/431	. . . using padding or de-padding
47/23	. . {Bit dropping}	47/50	. Queue scheduling
47/24	. . Traffic characterised by specific attributes, e.g. priority or QoS	47/52	. . by attributing bandwidth to queues
47/2408	. . . for supporting different services, e.g. a differentiated services [DiffServ] type of service	47/521	. . . {Static queue service slot or fixed bandwidth allocation}
47/2416	. . . Real-time traffic	47/522	. . . {Dynamic queue service slot or variable bandwidth allocation}
47/2425	. . . for supporting services specification, e.g. SLA	47/524	. . . . {Queue skipping}
47/2433	. . . . {Allocation of priorities to traffic types}	47/525	. . . by redistribution of residual bandwidth
47/2441	. . . relying on flow classification, e.g. using integrated services [IntServ]	47/527	. . . {Quantum based scheduling, e.g. credit or deficit based scheduling or token bank}
47/245	. . . {using preemption}	47/528	. . . {Minimum bandwidth guarantee}
47/2458	. . . {Modification of priorities while in transit}	47/54	. . {Loss aware scheduling}
47/2466	. . . using signalling traffic	47/56	. . implementing delay-aware scheduling
47/2475	. . . for supporting traffic characterised by the type of applications	47/562	. . . {Attaching a time tag to queues}
47/2483	. . . involving identification of individual flows		

- 47/564 . . . {Attaching a deadline to packets, e.g. earliest due date first}
- 47/566 . . . . {Deadline varies as a function of time spent in the queue}
- 47/568 . . . {Calendar queues or timing rings}
- 47/58 . . {Changing or combining different scheduling modes, e.g. multimode scheduling}
- 47/60 . . implementing hierarchical scheduling
- 47/62 . . characterised by scheduling criteria
- 47/6205 . . . {Arrangements for avoiding head of line blocking}
- 47/621 . . . {Individual queue per connection or flow, e.g. per VC}
- 47/6215 . . . {Individual queue per QoS, rate or priority}
- 47/622 . . . {Queue service order}
- 47/6225 . . . . {Fixed service order, e.g. Round Robin}
- 47/623 . . . . {Weighted service order}
- 47/6235 . . . . {Variable service order}
- 47/624 . . . {Altering the ordering of packets in an individual queue}
- 47/6245 . . . {Modifications to standard FIFO or LIFO}
- 47/625 . . . for service slots or service orders
- 47/6255 . . . . {queue load conditions, e.g. longest queue first}
- 47/626 . . . . {channel conditions}
- 47/6265 . . . . {past bandwidth allocation}
- 47/627 . . . . {policing}
- 47/6275 . . . . based on priority
- 47/628 . . . . based on packet size, e.g. shortest packet first
- 47/6285 . . . {Provisions for avoiding starvation of low priority queues}
- 47/629 . . . Ensuring fair share of resources, e.g. weighted fair queuing [WFQ]
- 47/6295 . . . using multiple queues, one for each individual QoS, connection, flow or priority
- 47/70 . Admission control; Resource allocation
- 47/72 . . using reservation actions during connection setup
- 47/722 . . . at the destination endpoint, e.g. reservation of terminal resources or buffer space
- 47/724 . . . at intermediate nodes, e.g. resource reservation protocol [RSVP]
- 47/726 . . . Reserving resources in multiple paths to be used simultaneously (by balancing the load [H04L 47/125](#))
- 47/728 . . . . {for backup paths}
- 47/74 . . measures in reaction to resource unavailability
- 47/741 . . . {Holding a request until resources become available}
- 47/743 . . . {Reaction at the end points}
- 47/745 . . . {Reaction in network}
- 47/746 . . . {Reaction triggered by a failure}
- 47/748 . . . {Negotiation of resources, e.g. modification of a request}
- 47/76 . . using dynamic resource allocation, e.g. in-call renegotiation requested by the user or requested by the network in response to changing network conditions
- 47/762 . . . triggered by the network
- 47/765 . . . triggered by the end-points
- 47/767 . . . . {after changing the attachment point, e.g. after hand-off}
- 47/78 . . Architectures of resource allocation
- 47/781 . . . {Centralised allocation of resources}
- 47/782 . . . {Hierarchical allocation of resources, e.g. involving a hierarchy of local and centralised entities}
- 47/783 . . . Distributed allocation of resources, e.g. bandwidth brokers
- 47/785 . . . . among multiple network domains, e.g. multilateral agreements
- 47/786 . . . . . {Mapping reservation between domains}
- 47/787 . . . . {Bandwidth trade among domains}
- 47/788 . . . {Autonomous allocation of resources}
- 47/80 . . Actions related to the user profile or the type of traffic
- 47/801 . . . {Real time traffic}
- 47/803 . . . {Application aware}
- 47/805 . . . {QoS or priority aware}
- 47/806 . . . {Broadcast or multicast traffic}
- 47/808 . . . {User-type aware}
- 47/82 . . {Miscellaneous aspects}
- 47/821 . . . {Prioritising resource allocation or reservation requests}
- 47/822 . . . {Collecting or measuring resource availability data}
- 47/824 . . . {Applicable to portable or mobile terminals}
- 47/825 . . . {Involving tunnels, e.g. MPLS}
- 47/826 . . . {Involving periods of time}
- 47/827 . . . {Aggregation of resource allocation or reservation requests}
- 47/828 . . . {Allocation of resources per group of connections, e.g. per group of users}
- 47/829 . . . {Topology based}
- 47/83 . . based on usage prediction
- 49/00 Packet switching elements**
- 49/10 . characterised by the switching fabric construction
- 49/101 . . using crossbar or matrix
- 49/102 . . using shared medium, e.g. bus or ring
- 49/103 . . using a shared central buffer; using a shared memory
- 49/104 . . Asynchronous transfer mode [ATM] switching fabrics
- 49/105 . . . {ATM switching elements}
- 49/106 . . . . {using space switching, e.g. crossbar or matrix}
- 49/107 . . . . . {using shared medium}
- 49/108 . . . . . {using shared central buffer}
- 49/109 . . Integrated on microchip, e.g. switch-on-chip
- 49/111 . . Switch interfaces, e.g. port details
- 49/112 . . Switch control, e.g. arbitration
- 49/113 . . Arrangements for redundant switching, e.g. using parallel planes
- 49/115 . . . Transferring a complete packet or cell through each plane
- 49/116 . . . Transferring a part of the packet through each plane, e.g. by bit-slicing
- 49/118 . . . Address processing within a device, e.g. using internal ID or tags for routing within a switch
- 49/15 . Interconnection of switching modules
- 49/1507 . . {Distribute and route fabrics, e.g. sorting-routing or Batcher-Banyan}
- 49/1515 . . Non-blocking multistage, e.g. Clos
- 49/1523 . . . {Parallel switch fabric planes}
- 49/153 . . . {ATM switching fabrics having parallel switch planes}



- 49/1538 . . . . {Cell slicing}
- 49/1546 . . . using pipelined operation
- 49/1553 . . {Interconnection of ATM switching modules, e.g. ATM switching fabrics}
- 49/1561 . . . {Distribute and route fabrics, e.g. Batcher-Banyan}
- 49/1569 . . . {Clos switching fabrics}
- 49/1576 . . . {Crossbar or matrix}
- 49/1584 . . . {Full Mesh, e.g. knockout}
- 49/1592 . . . {Perfect Shuffle}
- 49/20 . Support for services
- 49/201 . . Multicast operation; Broadcast operation
- 49/203 . . . {ATM switching fabrics with multicast or broadcast capabilities}
- 49/205 . . {Quality of Service based}
- 49/206 . . . {Real Time traffic}
- 49/208 . . {Port mirroring}
- 49/25 . Routing or path finding in a switch fabric
- 49/251 . . {Cut-through or wormhole routing}
- 49/252 . . {Store and forward routing}
- 49/253 . . using establishment or release of connections between ports
- 49/254 . . . {Centralised controller, i.e. arbitration or scheduling}
- 49/255 . . . {Control mechanisms for ATM switching fabrics}
- 49/256 . . {Routing or path finding in ATM switching fabrics}
- 49/257 . . . {Cut-through or wormhole routing}
- 49/258 . . . {Grouping}
- 49/30 . {Peripheral units, e.g. input or output ports}
- 49/3009 . . {Header conversion, routing tables or routing tags}
- 49/3018 . . {Input queuing}
- 49/3027 . . {Output queuing}
- 49/3036 . . {Shared queuing}
- 49/3045 . . {Virtual queuing}
- 49/3054 . . {Auto-negotiation, e.g. access control between switch gigabit interface connector [GBIC] and link}
- 49/3063 . . {Pipelined operation}
- 49/3072 . . {Packet splitting}
- 49/3081 . . {ATM peripheral units, e.g. policing, insertion or extraction}
- 49/309 . . . {Header conversion, routing tables or routing tags}
- 49/35 . Switches specially adapted for specific applications
- 49/351 . . for local area network [LAN], e.g. Ethernet switches
- 49/352 . . . {Gigabit ethernet switching [GBPS]}
- 49/353 . . {Support for fire wire switches, i.e. according to IEEE 1394}
- 49/354 . . for supporting virtual local area networks [VLAN]
- 49/355 . . {Application aware switches, e.g. for HTTP}
- 49/356 . . for storage area networks
- 49/357 . . . {Fibre channel switches}
- 49/358 . . . {Infiniband Switches}
- 49/40 . Constructional details, e.g. power supply, mechanical construction or backplane
- 49/405 . . {Physical details, e.g. power supply, mechanical construction or backplane of ATM switches}
- 49/45 . Arrangements for providing or supporting expansion
- 49/455 . . {Provisions for supporting expansion in ATM switches}
- 49/50 . Overload detection or protection within a single switching element
- 49/501 . . {Overload detection}
- 49/503 . . . {Policing}
- 49/505 . . Corrective measures
- 49/506 . . . Backpressure
- 49/508 . . . {Head of Line Blocking Avoidance}
- 49/55 . Prevention, detection or correction of errors
- 49/552 . . by ensuring the integrity of packets received through redundant connections
- 49/555 . . {Error detection}
- 49/557 . . {Error correction, e.g. fault recovery or fault tolerance}
- 49/60 . Software-defined switches
- 49/602 . . {Multilayer or multiprotocol switching, e.g. IP switching}
- 49/604 . . {Hybrid IP/Ethernet switches}
- 49/606 . . {Hybrid ATM switches, e.g. ATM&STM, ATM&Frame Relay or ATM&IP}
- 49/608 . . {ATM switches adapted to switch variable length packets, e.g. IP packets}
- 49/65 . Re-configuration of fast packet switches
- 49/70 . {Virtual switches}
- 49/90 . Buffering arrangements
- 49/9005 . . using dynamic buffer space allocation
- 49/901 . . using storage descriptor, e.g. read or write pointers
- 49/9015 . . for supporting a linked list
- 49/9021 . . {Plurality of buffers per packet}
- 49/9023 . . for implementing a jitter-buffer
- 49/9026 . . {Single buffer per packet}
- 49/9031 . . {Wraparound memory, e.g. overrun or underrun detection}
- 49/9036 . . {Common buffer combined with individual queues}
- 49/9042 . . {Separate storage for different parts of the packet, e.g. header and payload}
- 49/9047 . . including multiple buffers, e.g. buffer pools
- 49/9052 . . . {with buffers of different sizes}
- 49/9057 . . Arrangements for supporting packet reassembly or resequencing
- 49/9063 . . {Intermediate storage in different physical parts of a node or terminal}
- 49/9068 . . . {in the network interface card}
- 49/9073 . . . . {Early interruption upon arrival of a fraction of a packet}
- 49/9078 . . . {using an external memory or storage device}
- 49/9084 . . {Reactions to storage capacity overflow}
- 49/9089 . . . {replacing packets in a storage arrangement, e.g. pushout}
- 49/9094 . . . . {Arrangements for simultaneous transmit and receive, e.g. simultaneous reading/writing from/to the storage element}
- 51/00 User-to-user messaging in packet-switching networks, transmitted according to store-and-forward or real-time protocols, e.g. e-mail**
- 51/02 . using automatic reactions or user delegation, e.g. automatic replies or chatbot-generated messages

51/04	Real-time or near real-time messaging, e.g. instant messaging [IM]	61/2503	Translation of Internet protocol [IP] addresses
51/043	using or handling presence information	61/251	between different IP versions
51/046	Interoperability with other network applications or services	61/2514	between local and global IP addresses
51/06	Message adaptation to terminal or network requirements	61/2517	using port numbers
51/063	Content adaptation, e.g. replacement of unsuitable content	61/2521	Translation architectures other than single NAT servers
51/066	Format adaptation, e.g. format conversion or compression	61/2525	{Translation at a client}
51/07	characterised by the inclusion of specific contents	61/2528	{Translation at a proxy}
51/08	Annexed information, e.g. attachments	61/2532	{Clique of NAT servers}
51/10	Multimedia information	61/2535	{Multiple local networks, e.g. resolving potential IP address conflicts}
51/18	Commands or executable codes	61/2539	Hiding addresses; Keeping addresses anonymous
51/21	Monitoring or handling of messages	61/2546	Arrangements for avoiding unnecessary translation
51/212	using filtering or selective blocking	61/255	Maintenance or indexing of mapping tables
51/214	using selective forwarding	61/2553	Binding renewal aspects, e.g. using keep-alive messages
51/216	Handling conversation history, e.g. grouping of messages in sessions or threads	61/2557	Translation policies or rules
51/222	using geographical location information, e.g. messages transmitted or received in proximity of a certain spot or area	61/256	NAT traversal
51/224	providing notification on incoming messages, e.g. pushed notifications of received messages	61/2564	{for a higher-layer protocol, e.g. for session initiation protocol [SIP]}
51/226	Delivery according to priorities	61/2567	for reachability, e.g. inquiring the address of a correspondent behind a NAT server
51/23	Reliability checks, e.g. acknowledgments or fault reporting	61/2575	using address mapping retrieval, e.g. simple traversal of user datagram protocol through session traversal utilities for NAT [STUN]
51/234	for tracking messages	61/2578	without involvement of the NAT server
51/42	Mailbox-related aspects, e.g. synchronisation of mailboxes	61/2582	through control of the NAT server, e.g. using universal plug and play [UPnP]
51/48	Message addressing, e.g. address format or anonymous messages, aliases	61/2585	through application level gateway [ALG]
51/52	for supporting social networking services	61/2589	over a relay server, e.g. traversal using relay for network address translation [TURN]
51/56	Unified messaging, e.g. interactions between e-mail, instant messaging or converged IP messaging [CPM]	61/2591	{Identification of devices behind NAT devices}
51/58	Message adaptation for wireless communication	61/2592	using tunnelling or encapsulation
<b>61/00</b>	<b>Network arrangements, protocols or services for addressing or naming</b>	61/2596	Translation of addresses of the same type other than IP, e.g. translation from MAC to MAC addresses
<b>NOTE</b>		61/30	Managing network names, e.g. use of aliases or nicknames (name-to-address mapping H04L 61/45)
This group does not cover:		61/3005	{Mechanisms for avoiding name conflicts}
<ul style="list-style-type: none"> <li>{aspects relating to switching or routing which are covered by groups H04L 45/00 or H04L 49/00;}</li> <li>{aspects relating to configuration management of data networks or network elements in general, which are covered by group H04L 41/08}</li> <li>{aspects of addressing in telephony which are covered by group H04M 7/00;}</li> <li>{aspects of addressing within devices, e.g. process or memory, which are covered by groups G06F 13/42 or G06F 12/00.}</li> </ul>		61/301	Name conversion
		61/3015	Name registration, generation or assignment
		61/302	{Administrative registration, e.g. for domain names at internet corporation for assigned names and numbers [ICANN]}
		61/3025	{Domain name generation or assignment}
		61/35	{involving non-standard use of addresses for implementing network functionalities, e.g. coding subscription information within the address or functional addressing, i.e. assigning an address to a function}
61/09	Mapping addresses	61/45	Network directories; Name-to-address mapping
61/10	of different types	61/4505	using standardised directories; using standardised directory access protocols
61/103	across network layers, e.g. resolution of network layer into physical layer addresses or address resolution protocol [ARP]	61/4511	using domain name system [DNS]
61/106	across networks, e.g. mapping telephone numbers to data network addresses	61/4517	using open systems interconnection [OSI] directories, e.g. X.500
61/25	of the same type	61/4523	using lightweight directory access protocol [LDAP]

- 61/4535 . . using an address exchange platform which sets up a session between two nodes, e.g. rendezvous servers, session initiation protocols [SIP] registrars or H.323 gatekeepers
- 61/4541 . . Directories for service discovery
- 61/4547 . . {for personal communications, i.e. using a personal identifier}
- 61/4552 . . Lookup mechanisms between a plurality of directories; Synchronisation of directories, e.g. metadirectories
- 61/4553 . . {Object oriented directories, e.g. common object request broker architecture [CORBA] name server}
- 61/4555 . . {Directories for electronic mail or instant messaging}
- 61/4557 . . Directories for hybrid networks, e.g. including telephone numbers
- 61/457 . . {containing identifiers of data entities on a computer, e.g. file names}
- 61/4588 . . containing mobile subscriber information, e.g. home subscriber server [HSS]
- 61/4594 . . Address books, i.e. directories containing contact information about correspondents (telephone directories in user terminals [H04M 1/27453](#))
- 61/50 . . Address allocation
- 61/5007 . . Internet protocol [IP] addresses
- 61/5014 . . . using dynamic host configuration protocol [DHCP] or bootstrap protocol [BOOTP]
- 61/503 . . . using an authentication, authorisation and accounting [AAA] protocol, e.g. remote authentication dial-in user service [RADIUS] or Diameter
- 61/5038 . . for local use, e.g. in LAN or USB networks, or in a controller area network [CAN]
- 61/5046 . . Resolving address allocation conflicts; Testing of addresses (testing when self-assigning an address [H04L 61/5092](#))
- 61/5053 . . Lease time; Renewal aspects
- 61/5061 . . Pools of addresses
- 61/5069 . . for group communication, multicast communication or broadcast communication
- 61/5076 . . Update or notification mechanisms, e.g. DynDNS
- 61/5084 . . Providing for device mobility (network addressing or numbering for mobility support in wireless networks [H04W 8/26](#); mobile IP [H04W 80/04](#))
- 61/5092 . . by self-assignment, e.g. picking addresses at random and testing if they are already in use
- 61/58 . . Caching of addresses or names
- 61/59 . . using proxies for addressing
- 63/00** {Network architectures or network communication protocols for network security (cryptographic mechanisms or cryptographic arrangements for secret or secure communication [H04L 9/00](#); network architectures or network communication protocols for wireless network security [H04W 12/00](#); security arrangements for protecting computers or computer systems against unauthorised activity [G06F 21/00](#))}
- 63/02 . . {for separating internal from external traffic, e.g. firewalls}
- 63/0209 . . {Architectural arrangements, e.g. perimeter networks or demilitarized zones}
- 63/0218 . . . {Distributed architectures, e.g. distributed firewalls}
- 63/0227 . . {Filtering policies (mail message filtering [H04L 51/212](#))}
- 63/0236 . . . {Filtering by address, protocol, port number or service, e.g. IP-address or URL}
- 63/0245 . . . {Filtering by information in the payload}
- 63/0254 . . . {Stateful filtering}
- 63/0263 . . . {Rule management}
- 63/0272 . . {Virtual private networks}
- 63/0281 . . {Proxies}
- 63/029 . . {Firewall traversal, e.g. tunnelling or, creating pinholes}
- 63/04 . . {for providing a confidential data exchange among entities communicating through data packet networks}
- 63/0407 . . {wherein the identity of one or more communicating identities is hidden (cryptographic mechanisms or cryptographic arrangements for anonymous credentials or for identity based cryptographic systems [H04L 9/00](#))}
- 63/0414 . . . {during transmission, i.e. party's identity is protected against eavesdropping, e.g. by using temporary identifiers, but is known to the other party or parties involved in the communication}
- 63/0421 . . . {Anonymous communication, i.e. the party's identifiers are hidden from the other party or parties, e.g. using an anonymizer}
- 63/0428 . . {wherein the data content is protected, e.g. by encrypting or encapsulating the payload}
- 63/0435 . . . {wherein the sending and receiving network entities apply symmetric encryption, i.e. same key used for encryption and decryption (cryptographic mechanisms or cryptographic arrangements for symmetric key encryption [H04L 9/06](#))}
- 63/0442 . . . {wherein the sending and receiving network entities apply asymmetric encryption, i.e. different keys for encryption and decryption (cryptographic mechanisms or cryptographic arrangements for public-key encryption [H04L 9/30](#))}
- 63/045 . . . {wherein the sending and receiving network entities apply hybrid encryption, i.e. combination of symmetric and asymmetric encryption (cryptographic mechanisms or cryptographic arrangements using a plurality of keys or algorithms [H04L 9/14](#))}
- 63/0457 . . . {wherein the sending and receiving network entities apply dynamic encryption, e.g. stream encryption (cryptographic mechanisms or cryptographic arrangements for stream encryption [H04L 9/065](#))}
- 63/0464 . . . {using hop-by-hop encryption, i.e. wherein an intermediate entity decrypts the information and re-encrypts it before forwarding it}
- 63/0471 . . . {applying encryption by an intermediary, e.g. receiving clear information at the intermediary and encrypting the received information at the intermediary before forwarding}

- 63/0478 . . . {applying multiple layers of encryption, e.g. nested tunnels or encrypting the content with a first key and then with at least a second key (cryptographic mechanisms or cryptographic arrangements using a plurality of keys or algorithms [H04L 9/14](#))}
- 63/0485 . . . {Networking architectures for enhanced packet encryption processing, e.g. offloading of IPsec packet processing or efficient security association look-up}
- 63/0492 . . . {by using a location-limited connection, e.g. near-field communication or limited proximity of entities}
- 63/06 . {for supporting key management in a packet data network (cryptographic mechanisms or cryptographic arrangements for key management [H04L 9/08](#))}
- 63/061 . . {for key exchange, e.g. in peer-to-peer networks (cryptographic mechanisms or cryptographic arrangements for key agreement [H04L 9/0838](#))}
- 63/062 . . {for key distribution, e.g. centrally by trusted party (cryptographic mechanisms or cryptographic arrangements for key distribution involving a central third party [H04L 9/0819](#))}
- 63/064 . . . {Hierarchical key distribution, e.g. by multi-tier trusted parties}
- 63/065 . . {for group communications (cryptographic mechanisms or cryptographic arrangements for key management involving conference or group key [H04L 9/0833](#))}
- 63/067 . . {using one-time keys (cryptographic mechanisms or cryptographic arrangements for generation of one-time passwords [H04L 9/0863](#))}
- 63/068 . . {using time-dependent keys, e.g. periodically changing keys (cryptographic mechanisms or cryptographic arrangements for controlling usage of secret information [H04L 9/088](#))}
- 63/08 . {for authentication of entities (cryptographic mechanisms or cryptographic arrangements for entity authentication [H04L 9/32](#))}
- 63/0807 . . {using tickets, e.g. Kerberos (cryptographic mechanisms or cryptographic arrangements for entity authentication using tickets or tokens [H04L 9/3213](#))}
- 63/0815 . . {providing single-sign-on or federations}
- 63/0823 . . {using certificates (cryptographic mechanisms or cryptographic arrangements for entity authentication involving certificates [H04L 9/3263](#))}
- 63/083 . . {using passwords (cryptographic mechanisms or cryptographic arrangements for entity authentication using a predetermined code [H04L 9/3226](#))}
- 63/0838 . . . {using one-time-passwords}
- 63/0846 . . . {using time-dependent-passwords, e.g. periodically changing passwords}
- 63/0853 . . {using an additional device, e.g. smartcard, SIM or a different communication terminal (cryptographic mechanisms or cryptographic arrangements for entity authentication involving additional secure or trusted devices [H04L 9/3234](#))}
- 63/0861 . . {using biometrical features, e.g. fingerprint, retina-scan (cryptographic mechanisms or cryptographic arrangements for entity authentication using biological data [H04L 9/3231](#))}
- 63/0869 . . {for achieving mutual authentication (cryptographic mechanisms or cryptographic arrangements for mutual authentication [H04L 9/3273](#))}
- 63/0876 . . {based on the identity of the terminal or configuration, e.g. MAC address, hardware or software configuration or device fingerprint}
- 63/0884 . . {by delegation of authentication, e.g. a proxy authenticates an entity to be authenticated on behalf of this entity vis-à-vis an authentication entity}
- 63/0892 . . {by using authentication-authorization-accounting [AAA] servers or protocols}
- 63/10 . {for controlling access to devices or network resources}
- 63/101 . . {Access control lists [ACL]}
- 63/102 . . {Entity profiles}
- 63/104 . . {Grouping of entities}
- 63/105 . . {Multiple levels of security}
- 63/107 . . {wherein the security policies are location-dependent, e.g. entities privileges depend on current location or allowing specific operations only from locally connected terminals}
- 63/108 . . {when the policy decisions are valid for a limited amount of time}
- 63/12 . {Applying verification of the received information (cryptographic mechanisms or cryptographic arrangements for data integrity or data verification [H04L 9/32](#))}
- 63/123 . . {received data contents, e.g. message integrity}
- 63/126 . . {the source of the received data}
- 63/14 . {for detecting or protecting against malicious traffic}
- 63/1408 . . {by monitoring network traffic (monitoring network traffic per se [H04L 43/00](#))}
- 63/1416 . . . {Event detection, e.g. attack signature detection}
- 63/1425 . . . {Traffic logging, e.g. anomaly detection}
- 63/1433 . . {Vulnerability analysis}
- 63/1441 . . {Countermeasures against malicious traffic (countermeasures against attacks on cryptographic mechanisms [H04L 9/002](#))}
- 63/145 . . . {the attack involving the propagation of malware through the network, e.g. viruses, trojans or worms}
- 63/1458 . . . {Denial of Service}
- 63/1466 . . . {Active attacks involving interception, injection, modification, spoofing of data unit addresses, e.g. hijacking, packet injection or TCP sequence number attacks}
- 63/1475 . . . {Passive attacks, e.g. eavesdropping or listening without modification of the traffic monitored}
- 63/1483 . . . {service impersonation, e.g. phishing, pharming or web spoofing (detection of rogue wireless access points [H04W 12/12](#))}
- 63/1491 . . . {using deception as countermeasure, e.g. honeypots, honeynets, decoys or entrapment}



- 63/16 . {Implementing security features at a particular protocol layer}
- 63/162 . . {at the data link layer}
- 63/164 . . {at the network layer}
- 63/166 . . {at the transport layer}
- 63/168 . . {above the transport layer}
- 63/18 . {using different networks or channels, e.g. using out of band channels ([cryptographic mechanisms](#) or cryptographic arrangements for key distribution involving distinctive intermediate devices or communication paths [H04L 9/0827](#); cryptographic mechanisms or cryptographic arrangements for authentication using a plurality of channels [H04L 9/3215](#))}
- 63/20 . {for managing network security; network security policies in general ([filtering policies H04L 63/0227](#))}
- 63/205 . . {involving negotiation or determination of the one or more network security mechanisms to be used, e.g. by negotiation between the client and the server or between peers or by selection according to the capabilities of the entities involved ([negotiation of communication capabilities H04L 69/24](#))}
- 63/30 . {for supporting lawful interception, monitoring or retaining of communications or communication related information ([circuit switched telephony call monitoring H04M 3/2281](#))}
- 63/302 . . {gathering intelligence information for situation awareness or reconnaissance}
- 63/304 . . {intercepting circuit switched data communications ([lawful interception of wireless network communications H04W 12/02](#))}
- 63/306 . . {intercepting packet switched data communications, e.g. Web, Internet or IMS communications}
- 63/308 . . {retaining data, e.g. retaining successful, unsuccessful communication attempts, internet access, or e-mail, internet telephony, intercept related information or call content}
- 65/00 Network arrangements, protocols or services for supporting real-time applications in data packet communication (real-time or near real-time messaging, e.g. instant messaging [IM] [H04L 51/04](#); selective video distribution [H04N 21/00](#))**
- NOTES**
1. {This group covers:
- only communications which fulfill the following two conditions:
    - i. they are based on packet data;
    - ii. there is real-time or pseudo-real-time temporal association between source and destination, or source and network, or destination and network;
  - provided that the above two conditions are met, this group covers arrangements relating to
    - a. the transmission of the multimedia data itself,
    - b. the user-to-user, user-to-network, inter-network or intra-network signalling supporting:
      - b1. the establishment of a session for the subsequent transmission of the multimedia data, or
      - b2. the maintenance of the session or
      - b3. the application services available to the user during the session (unless explicitly excluded in certain cases). }
2. {This group does not cover:
- non-real-time multimedia file transfer, which is covered by group [H04L 67/06](#);
  - multimedia store or forward messaging as in e-mail, MMS or the like, which is covered by group [H04L 51/00](#);
  - analogue video streaming, as in analogue television systems, which is covered by group [H04N 7/00](#);
  - selective distribution of MPEG elementary or transport streams, containing video and/or additional data, which is covered by group [H04N 21/00](#);
  - bit streaming, i.e. not packet-based, such as in ISDN, which is covered by group [H04Q 11/0428](#);
  - instant messaging, which is covered by group [H04L 51/04](#);
  - any other multimodal data communications which do not meet the conditions of being packet-based and real-time or pseudo-real-time;
  - flow control in packet switching networks, which is covered by group [H04L 47/10](#). }
3. {In this group the following terms or expressions are used with the meaning indicated:
- H.323 means International Telecommunication Union Recommendation no. 323, series H, entitled "Packet-based multimedia communications systems"
  - IP means Internet Protocol
  - IMS means IP Multimedia Subsystem
  - ISDN means Integrated Services Digital Network
  - MGC means Media Gateway Control/Controller
  - MGCP means Media Gateway Control Protocol
  - MMS means Multimedia Messaging Service
  - PBX means Private Branch Exchange
  - PSTN means Public Switched Telephone Network
  - QoS means Quality of Service
  - RTP means Real Time Protocol
  - RTCP means Real Time Control Protocol
  - RTSP means Real Time Streaming Protocol.
  - SIP means Session Initiation Protocol
  - SPAM means unsolicited electronic mail
  - SPIT means SPAM Prevention in IP Telephony }
- 65/10 . Architectures or entities
- 65/1013 . . {Network architectures, gateways, control or user entities}
- 65/1016 . . IP multimedia subsystem [IMS]
- 65/102 . . Gateways ([arrangements for connecting between networks having differing types of switching systems, e.g. gateways, \[H04L 12/66\]\(#\)](#))
- 65/1023 . . . Media gateways

- 65/1026 . . . . {at the edge}
- 65/103 . . . . {in the network}
- 65/1033 . . . Signalling gateways
- 65/1036 . . . . {at the edge}
- 65/104 . . . . {in the network}
- 65/1043 . . . Gateway controllers, e.g. media gateway control protocol [MGCP] controllers
- 65/1045 . . Proxies, e.g. for session initiation protocol [SIP]
- 65/1046 . . Call controllers; Call servers
- 65/1053 . . IP private branch exchange [PBX] functionality entities or arrangements ([circuit switched PBXs H04M 3/00](#))
- 65/1055 . . . Single-site
- 65/1056 . . . Multi-site
- 65/1059 . . End-user terminal functionalities specially adapted for real-time communication
- 65/1063 . . Application servers providing network services ([systems providing special services to telephonic subscribers H04M 3/42](#))
- 65/1066 . Session management
- 65/1069 . . Session establishment or de-establishment
- 65/1073 . . Registration or de-registration
- 65/1076 . . Screening of IP real time communications, e.g. spam over Internet telephony [SPIT]
- 65/1079 . . . {of unsolicited session attempts, e.g. SPIT}
- 65/1083 . . In-session procedures
- 65/1086 . . . {session scope modification}
- 65/1089 . . . by adding media; by removing media
- 65/1093 . . . by adding participants; by removing participants
- 65/1094 . . . Inter-user-equipment sessions transfer or sharing
- 65/1095 . . . Inter-network session transfer or sharing
- 65/1096 . . Supplementary features, e.g. call forwarding or call holding ([systems providing special services or facilities to telephony subscribers H04M 3/42](#))
- 65/1101 . . Session protocols
- 65/1104 . . . Session initiation protocol [SIP]
- 65/1106 . . . Call signalling protocols; H.323 and related
- 65/1108 . . . Web based protocols, e.g. webRTC
- 65/40 . Support for services or applications
- 65/401 . . wherein the services involve a main real-time session and one or more additional parallel real-time or time sensitive sessions, e.g. white board sharing or spawning of a subconference
- 65/4015 . . . {where at least one of the additional parallel sessions is real time or time sensitive, e.g. white board sharing, collaboration or spawning of a subconference}
- 65/402 . . wherein the services involve a main real-time session and one or more additional parallel non-real time sessions, e.g. downloading a file in a parallel FTP session, initiating an email or combinational services
- 65/4025 . . . {where none of the additional parallel sessions is real time or time sensitive, e.g. downloading a file in a parallel FTP session, initiating an email or combinational services}
- 65/403 . . Arrangements for multi-party communication, e.g. for conferences ([data switching systems for conference H04L 12/18](#); [arrangements for connecting several subscribers to a common circuit, i.e. affording conference facilities H04M 3/56](#); [television conferencing systems H04N 7/15](#))
- 65/4038 . . . with floor control
- 65/4046 . . . {with distributed floor control}
- 65/4053 . . . without floor control
- 65/4061 . . Push-to services, e.g. push-to-talk or push-to-video
- 65/60 . Network streaming of media packets
- 65/61 . . for supporting one-way streaming services, e.g. Internet radio
- 65/611 . . . for multicast or broadcast ([systems for broadcast or conference H04L 12/18](#); [arrangements for broadcast or distribution combined with broadcast H04H 20/00](#); [arrangements for broadcast applications with a direct linkage to broadcast information or to broadcast space-time H04H 60/00](#); [selective distribution of broadcast services, e.g. multimedia broadcast multicast service \[MBMS\], H04W 4/06](#))
- 65/612 . . . for unicast
- 65/613 . . . for the control of the source by the destination ([control signals issued by the client directed to the server or network components specially adapted for selective content distribution H04N 21/637](#))
- 65/65 . . Network streaming protocols, e.g. real-time transport protocol [RTP] or real-time control protocol [RTCP]
- 65/70 . . Media network packetisation
- 65/75 . . Media network packet handling
- 65/752 . . . adapting media to network capabilities
- 65/756 . . . adapting media to device capabilities
- 65/762 . . . {at the source ([reformatting of additional data in video distribution servers H04N 21/2355](#))}
- 65/764 . . . {at the destination ([reformatting of additional data in video clients H04N 21/4355](#))}
- 65/765 . . . {intermediate}
- 65/80 . Responding to QoS
- 67/00** **Network arrangements or protocols for supporting network services or applications** ([user-to-user messaging H04L 51/00](#); [network arrangements, protocols or services for supporting real-time applications in data packet communications networks H04L 65/00](#))

## NOTES

### 1. This group covers:

1. Networking arrangements or communication protocols to support networked applications which occur at the abstract network layers 5 to 7 of the OSI layer model. The higher layers constitute the interface between the network and the computer applications that use the network to communicate.
2. Network-specific aspects of client-server applications as well as of networking arrangements supporting networked/distributed applications, e.g. data transport, scheduling. This group also covers specific networked

H04L 67/00  
(continued)

application layer protocols, e.g. FTP, WAP, HTTP.

2. This group does not cover:

1. Distributed applications which are network-agnostic, i.e. distributed information systems for which the network functions are transparent. These field are covered, e.g. by [G06F 9/00](#), [G06F 17/00](#). Data switching network provisions in general and the lower layer network functionalities which support application layer provisions are covered by [H04L 12/00](#)

- 67/01 . Protocols
- 67/02 . . based on web technology, e.g. hypertext transfer protocol [HTTP]
- 67/025 . . . for remote control or remote monitoring of applications
- 67/04 . . specially adapted for terminals or networks with limited capabilities; specially adapted for terminal portability
- 67/06 . . specially adapted for file transfer, e.g. file transfer protocol [FTP]
- 67/08 . . specially adapted for terminal emulation, e.g. Telnet
- 67/10 . . in which an application is distributed across nodes in the network ([software deployment G06F 8/60](#); [multiprogramming arrangements G06F 9/46](#))
- 67/1001 . . . for accessing one among a plurality of replicated servers
- 67/10015 . . . . {Access to distributed or replicated servers, e.g. using brokers}
- 67/1004 . . . . Server selection for load balancing
- 67/1006 . . . . with static server selection, e.g. the same server being selected for a specific client
- 67/1008 . . . . based on parameters of servers, e.g. available memory or workload ([monitoring of computer activity G06F 11/30](#))
- 67/101 . . . . based on network conditions
- 67/1012 . . . . based on compliance of requirements or conditions with available server resources
- 67/1014 . . . . based on the content of a request
- 67/1017 . . . . based on a round robin mechanism
- 67/1019 . . . . Random or heuristic server selection
- 67/1021 . . . . based on client or server locations
- 67/1023 . . . . based on a hash applied to IP addresses or costs
- 67/1025 . . . . Dynamic adaptation of the criteria on which the server selection is based
- 67/1027 . . . . Persistence of sessions during load balancing
- 67/1029 . . . . using data related to the state of servers by a load balancer
- 67/1031 . . . . Controlling of the operation of servers by a load balancer, e.g. adding or removing servers that serve requests
- 67/1034 . . . . Reaction to server failures by a load balancer
- 67/1036 . . . . Load balancing of requests to servers for services different from user content provisioning, e.g. load balancing across domain name servers
- 67/1038 . . . . Load balancing arrangements to avoid a single path through a load balancer
- 67/104 . . . Peer-to-peer [P2P] networks
- 67/1042 . . . . using topology management mechanisms

- 67/1044 . . . . {Group management mechanisms (management of multicast group membership [H04L 12/185](#); reconfiguring of node membership in a computing system to eliminate errors [G06F 11/1425](#))}
- 67/1046 . . . . . {Joining mechanisms}
- 67/1048 . . . . . {Departure or maintenance mechanisms}
- 67/1051 . . . . . {Group master selection mechanisms}
- 67/1053 . . . . . {with pre-configuration of logical or physical connections with a determined number of other peers}
- 67/1055 . . . . . {involving connection limits (involving dynamic management of active down- or uploading connections [H04L 67/1085](#))}
- 67/1057 . . . . . {involving pre-assessment of levels of reputation of peers}
- 67/1059 . . . . {Inter-group management mechanisms, e.g. splitting, merging or interconnection of groups}
- 67/1061 . . . . using node-based peer discovery mechanisms (static access to replicated servers [H04L 67/1006](#); service discovery [H04L 67/51](#))
- 67/1063 . . . . . {Discovery through centralising entities}
- 67/1065 . . . . . {Discovery involving distributed pre-established resource-based relationships among peers, e.g. based on distributed hash tables [DHT] (pre-configuration of logical or physical connections [H04L 67/1053](#))}
- 67/1068 . . . . . {Discovery involving direct consultation or announcement among potential requesting and potential source peers}
- 67/107 . . . . . {with limitation or expansion of the discovery scope}
- 67/1072 . . . . . {Discovery involving ranked list compilation of candidate peers}
- 67/1074 . . . . for supporting data block transmission mechanisms ([file transfer H04L 67/06](#))
- 67/1076 . . . . . {Resource dissemination mechanisms or network resource keeping policies for optimal resource availability in the overlay network}
- 67/1078 . . . . . {Resource delivery mechanisms}
- 67/108 . . . . . {characterised by resources being split in blocks or fragments}
- 67/1082 . . . . . {involving incentive schemes}
- 67/1085 . . . . . {involving dynamic management of active down- or uploading connections}
- 67/1087 . . . . using cross-functional networking aspects
- 67/1089 . . . . . {Hierarchical topologies}
- 67/1091 . . . . . {Interfacing with client-server systems or between P2P systems}
- 67/1093 . . . . . {Some peer nodes performing special functions}
- 67/1095 . . . Replication or mirroring of data, e.g. scheduling or transport for data synchronisation between network nodes
- 67/1097 . . . for distributed storage of data in networks, e.g. transport arrangements for network file system [NFS], storage area networks [SAN] or network attached storage [NAS]

- 67/12 . . specially adapted for proprietary or special-purpose networking environments, e.g. medical networks, sensor networks, networks in vehicles or remote metering networks
- 67/125 . . . involving control of end-device applications over a network
- 67/131 . . Protocols for games, networked simulations or virtual reality
- 67/133 . . Protocols for remote procedure calls [RPC]
- 67/1396 . . specially adapted for monitoring users' activity
- 67/14 . Session management ([for real-time applications in data packet communications networks H04L 65/1066](#))
- 67/141 . . Setup of application sessions ([admission control or resource allocation in data switching networks H04L 47/70](#))
- 67/142 . . Managing session states for stateless protocols; Signalling session states; State transitions; Keeping-state mechanisms
- 67/143 . . Termination or inactivation of sessions, e.g. event-controlled end of session
- 67/145 . . . avoiding end of session, e.g. keep-alive, heartbeats, resumption message or wake-up for inactive or interrupted session
- 67/146 . . Markers for unambiguous identification of a particular session, e.g. session cookie or URL-encoding
- 67/147 . . Signalling methods or messages providing extensions to protocols defined by standardisation
- 67/148 . . Migration or transfer of sessions
- 67/2866 . Architectures; Arrangements
- 67/2869 . . Terminals specially adapted for communication
- 67/2871 . . Implementation details of single intermediate entities
- 67/2876 . . Pairs of inter-processing entities at each side of the network, e.g. split proxies
- 67/288 . . Distributed intermediate devices, i.e. intermediate devices for interaction with other intermediate devices on the same level
- 67/2885 . . Hierarchically arranged intermediate devices, e.g. for hierarchical caching
- 67/289 . . Intermediate processing functionally located close to the data consumer application, e.g. in same machine, in same home or in same sub-network
- 67/2895 . . Intermediate processing functionally located close to the data provider application, e.g. reverse proxies
- 67/30 . . Profiles
- 67/303 . . . Terminal profiles
- 67/306 . . . User profiles
- 67/34 . {[involving the movement of software or configuration parameters \(network booting or remote initial program loading \[RIPL\] G06F 9/4416\)](#)}
- 67/50 . Network services
- 67/51 . . Discovery or management thereof, e.g. service location protocol [SLP] or web services
- 67/52 . . specially adapted for the location of the user terminal
- 67/53 . . using third party service providers
- 67/535 . . {[Tracking the activity of the user \(network monitoring arrangements H04L 43/00; recording of computer activity G06F 11/34\)](#)}
- 67/54 . . Presence management, e.g. monitoring or registration for receipt of user log-on information, or the connection status of the users
- 67/55 . . Push-based network services
- 67/56 . . Provisioning of proxy services ([store-and-forward switching systems in data switching networks H04L 12/54](#))
- 67/561 . . . Adding application-functional data or data for application control, e.g. adding metadata
- 67/562 . . . Brokering proxy services
- 67/563 . . . Data redirection of data network streams
- 67/564 . . . Enhancement of application control based on intercepted application data
- 67/565 . . . Conversion or adaptation of application format or content ([adding application control or application functional data H04L 67/561](#))
- 67/5651 . . . . Reducing the amount or size of exchanged application data
- 67/566 . . . Grouping or aggregating service requests, e.g. for unified processing
- 67/567 . . . Integrating service provisioning from a plurality of service providers
- 67/568 . . . Storing data temporarily at an intermediate stage, e.g. caching
- 67/5681 . . . . Pre-fetching or pre-delivering data based on network characteristics
- 67/5682 . . . . Policies or rules for updating, deleting or replacing the stored data
- 67/5683 . . . . Storage of data provided by user terminals, i.e. reverse caching
- 67/59 . . . Providing operational support to end devices by off-loading in the network or by emulation, e.g. when they are unavailable
- 67/60 . . Scheduling or organising the servicing of application requests, e.g. requests for application data transmissions using the analysis and optimisation of the required network resources ([admission control or resource allocation H04L 47/70](#))
- 67/61 . . . taking into account QoS or priority requirements
- 67/62 . . . Establishing a time schedule for servicing the requests
- 67/63 . . . Routing a service request depending on the request content or context
- 67/75 . . Indicating network or usage conditions on the user display
- 69/00 Network arrangements, protocols or services independent of the application payload and not provided for in the other groups of this subclass ([networks security protocols H04L 9/40](#); [wireless communication networks H04W](#))**
- 69/02 . {[Protocol performance](#)}
- 69/03 . {[Protocol definition or specification \(protocol conformance testing H04L 1/244\)](#)}
- 69/04 . Protocols for data compression, e.g. ROHC
- 69/06 . Notations for structuring of protocol data, e.g. abstract syntax notation one [ASN.1]
- 69/08 . Protocols for interworking; Protocol conversion
- 69/085 . . specially adapted for interworking of IP-based networks with other networks
- 69/10 . Streamlined, light-weight or high-speed protocols, e.g. express transfer protocol [XTP] or byte stream
- 69/12 . Protocol engines



69/14	• Multichannel or multilink protocols	2101/00	<b>Indexing scheme associated with group <a href="#">H04L 61/00</a></b>
69/16	• Implementation or adaptation of Internet protocol [IP], of transmission control protocol [TCP] or of user datagram protocol [UDP]	2101/30	• Types of network names
69/161	• • {Implementation details of TCP/IP or UDP/IP stack architecture; Specification of modified or new header fields}	2101/32	• • containing non-Latin characters, e.g. Chinese domain names
69/162	• • • {involving adaptations of sockets based mechanisms ( <a href="#">secure socket layer H04L 63/168</a> )}	2101/33	• • containing protocol addresses or telephone numbers
69/163	• • In-band adaptation of TCP data exchange; In-band control procedures	2101/345	• • containing wildcard characters
69/164	• • Adaptation or special uses of UDP protocol	2101/35	• • containing special prefixes
69/165	• • Combined use of TCP and UDP protocols; selection criteria therefor	2101/355	• • containing special suffixes
69/166	• • IP fragmentation; TCP segmentation	2101/365	• • Application layer names, e.g. buddy names, unstructured names chosen by a user or home appliance name
69/167	• • Adaptation for transition between two IP versions, e.g. between IPv4 and IPv6 ( <a href="#">translation of Internet protocol [IP] addresses H04L 61/2503</a> )	2101/37	• • E-mail addresses
69/168	• • specially adapted for link layer protocols, e.g. asynchronous transfer mode [ATM], synchronous optical network [SONET] or point-to-point protocol [PPP]	2101/375	• • Access point names [APN]
69/169	• • {Special adaptations of TCP, UDP or IP for interworking of IP based networks with other networks ( <a href="#">protocols for interworking, protocol conversion H04L 69/08</a> )}	2101/38	• • Telephone uniform resource identifier [URI]
69/18	• Multiprotocol handlers, e.g. single devices capable of handling multiple protocols	2101/385	• • Uniform resource identifier for session initiation protocol [SIP URI]
69/22	• Parsing or analysis of headers	2101/39	• • Globally routable user-agent uniform resource identifier [GRUU] for the session initiation protocol [SIP]
69/24	• Negotiation of communication capabilities	2101/395	• • Internet protocol multimedia private identity [IMPI]; Internet protocol multimedia public identity [IMPU]
69/26	• {Special purpose or proprietary protocols or architectures ( <a href="#">network applications for proprietary or special purpose networking environments H04L 67/12</a> )}	2101/60	• Types of network addresses
69/28	• Timers or timing mechanisms used in protocols	2101/604	• • Address structures or formats
69/30	• Definitions, standards or architectural aspects of layered protocol stacks	2101/618	• • Details of network addresses
69/32	• • Architecture of open systems interconnection [OSI] 7-layer type protocol stacks, e.g. the interfaces between the data link level and the physical level	2101/622	• • • Layer-2 addresses, e.g. medium access control [MAC] addresses
69/321	• • • Interlayer communication protocols or service data unit [SDU] definitions; Interfaces between layers	2101/627	• • • Controller area network [CAN] identifiers
69/322	• • • Intralayer communication protocols among peer entities or protocol data unit [PDU] definitions	2101/631	• • • Small computer system interface [SCSI] addresses
69/323	• • • • in the physical layer [OSI layer 1]	2101/636	• • • IEEE1394 identification numbers
69/324	• • • • in the data link layer [OSI layer 2], e.g. HDLC	2101/64	• • • Asynchronous transfer mode [ATM] addresses
69/325	• • • • in the network layer [OSI layer 3], e.g. X.25 ( <a href="#">H04L 69/16 takes precedence</a> )	2101/645	• • • Fibre channel identifiers
69/326	• • • • in the transport layer [OSI layer 4] ( <a href="#">H04L 69/16 takes precedence</a> )	2101/65	• • • Telephone numbers
69/327	• • • • in the session layer [OSI layer 5]	2101/654	• • • International mobile subscriber identity [IMSI] numbers
69/328	• • • • in the presentation layer [OSI layer 6]	2101/659	• • • Internet protocol version 6 [IPv6] addresses
69/329	• • • • in the application layer [OSI layer 7]	2101/663	• • • Transport layer addresses, e.g. aspects of transmission control protocol [TCP] or user datagram protocol [UDP] ports
69/40	• for recovering from a failure of a protocol instance or entity, e.g. service redundancy protocols, protocol state redundancy or protocol service redirection ( <a href="#">management of faults, events, alarms or notifications in data switching networks H04L 41/06</a> )	2101/668	• • Internet protocol [IP] address subnets
		2101/672	• • Short addresses
		2101/677	• • Multiple interfaces, e.g. multihomed nodes
		2101/681	• • using addresses for wireless personal area networks or wireless sensor networks, e.g. Zigbee addresses
		2101/686	• • using dual-stack hosts, e.g. in Internet protocol version 4 [IPv4]/Internet protocol version 6 [IPv6] networks
		2101/69	• • using geographic information, e.g. room number
		2101/695	• • using masks or ranges of addresses
		2201/00	<b>Algorithms used for the adjustment of time-domain equalizers</b>
		2201/02	• minimizing an error signal, e.g. least squares, minimum square error
		2201/04	• zero-forcing
		2201/06	• using the output of a maximum likelihood decoder (Viterbi detector)
		2201/08	• Algorithms not covered by groups <a href="#">H04L 2201/02</a> - <a href="#">H04L 2201/06</a>

**2203/00 Characteristics of phase shift key signals**

- 2203/02 . differential
- 2203/04 . continuous phase

**2209/00 Additional information or applications relating to cryptographic mechanisms or cryptographic arrangements for secret or secure communication**  
[H04L 9/00](#)

- 2209/04 . Masking or blinding
- 2209/043 . . of tables, e.g. lookup, substitution or mapping
- 2209/046 . . of operations, operands or results of the operations
- 2209/08 . Randomization, e.g. dummy operations or using noise
- 2209/12 . Details relating to cryptographic hardware or logic circuitry
- 2209/122 . . Hardware reduction or efficient architectures
- 2209/125 . . Parallelization or pipelining, e.g. for accelerating processing of cryptographic operations
- 2209/127 . . Trusted platform modules [TPM]
- 2209/16 . Obfuscation or hiding, e.g. involving white box
- 2209/20 . Manipulating the length of blocks of bits, e.g. padding or block truncation
- 2209/24 . Key scheduling, i.e. generating round keys or sub-keys for block encryption
- 2209/26 . Testing cryptographic entity, e.g. testing integrity of encryption key or encryption algorithm
- 2209/30 . Compression, e.g. Merkle-Damgard construction
- 2209/34 . Encoding or coding, e.g. Huffman coding or error correction
- 2209/42 . Anonymization, e.g. involving pseudonyms
- 2209/46 . Secure multiparty computation, e.g. millionaire problem
- 2209/463 . . Electronic voting
- 2209/466 . . Electronic auction
- 2209/50 . Oblivious transfer
- 2209/56 . Financial cryptography, e.g. electronic payment or e-cash
- 2209/60 . Digital content management, e.g. content distribution
- 2209/601 . . Broadcast encryption
- 2209/603 . . Digital right managment [DRM]
- 2209/605 . . Copy protection
- 2209/606 . . Traitor tracing
- 2209/608 . . Watermarking
- 2209/64 . Self-signed certificates
- 2209/68 . Special signature format, e.g. XML format
- 2209/72 . Signcrypting, i.e. digital signing and encrypting simultaneously
- 2209/76 . Proxy, i.e. using intermediary entity to perform cryptographic operations
- 2209/80 . Wireless
- 2209/805 . . Lightweight hardware, e.g. radio-frequency identification [RFID] or sensor
- 2209/84 . Vehicles
- 2209/88 . Medical equipments

**2212/00 Encapsulation of packets****2463/00 Additional details relating to network architectures or network communication protocols for network security covered by [H04L 63/00](#)**

- 2463/041 . using an encryption or decryption engine integrated in transmitted data

- 2463/061 . applying further key derivation, e.g. deriving traffic keys from a pair-wise master key
- 2463/062 . applying encryption of the keys
- 2463/081 . applying self-generating credentials, e.g. instead of receiving credentials from an authority or from another peer, the credentials are generated at the entity itself
- 2463/082 . applying multi-factor authentication
- 2463/101 . applying security measures for digital rights management
- 2463/102 . applying security measure for e-commerce
- 2463/103 . applying security measure for protecting copyright
- 2463/121 . Timestamp
- 2463/141 . Denial of service attacks against endpoints in a network
- 2463/142 . Denial of service attacks against network infrastructure
- 2463/143 . Denial of service attacks involving systematic or selective dropping of packets
- 2463/144 . Detection or countermeasures against botnets
- 2463/145 . Detection or countermeasures against cache poisoning
- 2463/146 . Tracing the source of attacks