

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:

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

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.

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| 1/00 | Arrangements for detecting or preventing errors in the information received {(correcting synchronisation H04L 7/00)} | 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 H04L 5/0044 ; controlling transmission power for radio systems H04W 52/04)} | 1/0009 | . . {by adapting the channel coding (H04L 1/1812 takes precedence)} |
| | | 1/001 | . . . {applied to control information} |
| | | 1/0011 | . . . {applied to payload information} |
| 1/0002 | . . {by adapting the transmission rate} | 1/0013 | . . . {Rate matching, e.g. puncturing or repetition of code symbols} |
| 1/0003 | . . . {by switching between different modulation schemes} | 1/0014 | . . {by adapting the source coding} |
| | | 1/0015 | . . {characterised by the adaptation strategy} |
| 1/0004 | {applied to control information} | 1/0016 | . . . {involving special memory structures, e.g. look-up tables} |
| 1/0005 | {applied to payload information} | | |
| 1/0006 | . . {by adapting the transmission format} | | |

- 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}

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| 1/0091 | . . {arrangements specific to receivers, e.g. format detection (detection of data rate H04L 25/0262 ; detection of coding rate H04L 1/0046)} | 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 H04N 21/44004)} |
| 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 H04L 5/0053)} |
| 1/0687 | {Full feedback} | 1/1864 | {ARQ related signaling (H04L 1/1607 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 (H04L 1/1858 and H04L 1/189 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 H04N 21/44004)} |
| 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 (H04L 1/1614 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}
 - 7/0338 {the correction of the phase error being performed by a feed forward loop}
 - 7/04 . Speed or phase control by synchronisation signals {(H04L 7/0075 takes precedence)}
 - 7/041 . . {using special codes as synchronising signal}
 - 7/042 . . . {Detectors therefor, e.g. correlators, state machines (digital correlators in general G06F 17/15)}
 - 7/043 . . . {Pseudo-noise [PN] codes variable during transmission (synchronisation of spread spectrum receivers H04B 1/69)}
 - 7/044 . . . {using a single bit, e.g. start stop bit}
 - 2007/045 . . . {Fill bit or bits, idle words}
 - 7/046 . . . {using a dotting sequence}
 - 2007/047 . . . {using a sine signal or unmodulated carrier}
 - 7/048 . . {using the properties of error detecting or error correcting codes, e.g. parity as synchronisation signal}
 - 7/06 . . the synchronisation signals differing from the information signals in amplitude, polarity or frequency {or length}
 - 7/065 . . . {and superimposed by modulation}
 - 7/08 . . the synchronisation signals recurring cyclically
 - 7/10 . . Arrangements for initial synchronisation
 - 9/00 {Cryptographic mechanisms or cryptographic} arrangements for secret or secure communications; Network security protocols**
- NOTES**
1. This group covers:
 - 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).
 - 1.2 H04L 9/00 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.
 - 1.3 H04L 9/00 covers also countermeasures against attacks on cryptographic mechanisms.
 2. This group does not cover:
 - 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 packet networks, which are covered by H04L 63/00. Attention is drawn to the Note 1. after group H04L 63/00
 - 2.2 Security arrangements for protecting computers or computer systems against unauthorised activity, which are covered by G06F 21/00
 3. In subgroups H04L 9/001 - H04L 9/38, 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.
 - 9/001 . {using chaotic signals}
 - 9/002 . {Countermeasures against attacks on cryptographic mechanisms (network architectures or network communication protocols for protection against malicious traffic H04L 63/1441)}
 - 9/003 . . {for power analysis, e.g. differential power analysis [DPA] or simple power analysis [SPA]}
 - 9/004 . . {for fault attacks}
 - 9/005 . . {for timing attacks}
 - 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 H04L 63/0823)}
 - 9/007 . . {involving hierarchical structures}
 - 9/008 . {involving homomorphic encryption}
 - 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}
 - 9/0618 . . {Block ciphers, i.e. encrypting groups of characters of a plain text message using fixed encryption transformation}
 - 9/0625 . . . {with splitting of the data block into left and right halves, e.g. Feistel based algorithms, DES, FEAL, IDEA or KASUMI}
 - 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}
 - 9/0637 . . . {Modes of operation, e.g. cipher block chaining [CBC], electronic codebook [ECB] or Galois/counter mode [GCM]}
 - 9/0643 . . {Hash functions, e.g. MD5, SHA, HMAC or f9 MAC}
 - 9/065 . . {Encryption by serially and continuously modifying data stream elements, e.g. stream cipher systems, RC4, SEAL or A5/3}
 - 9/0656 . . . {Pseudorandom key sequence combined element-for-element with data sequence, e.g. one-time-pad [OTP] or Vernam's cipher}
 - 9/0662 {with particular pseudorandom sequence generator}
 - 9/0668 {producing a non-linear pseudorandom sequence}
 - 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 H04L 63/06)}

- 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

H04L

H04L 12/2856
(continued)

| | | | | |
|---------|---|----------|-----------|---|
| | line equipments, which is covered by H04M 11/06 | 12/2869 | | {Operational details of access network equipments (admission control or resource allocation in access networks H04L 12/5692)} |
| | • design of DSL, digital subscriber line, modems, which is covered by H04M 11/06 | 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 H04L 12/2803 | 12/2872 | | {Termination of subscriber connections} |
| | • management of WDM parameters in optical multiplex systems, which is covered by H04J 14/02 | 12/2874 | | {Processing of data for distribution to the subscribers} |
| | • circuit-switched access networks, which are covered by H04M 7/1205 | 12/2876 | | {Handling of subscriber policies (group policies management H04L 41/0893)} |
| | • access arrangements for providing telephone service in networks other than PSTN/ISDN, which are covered by H04M 7/0066 | 12/2878 | | {Access multiplexer, e.g. DSLAM (generic distributed time multiplexers, e.g. TDM/TDMA H04J 3/1694)} |
| 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 (optical network equipment H04B 10/00 ; optical multiplexers H04J 14/05 and H04J 14/07)} |
| | • 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 (DSL modems H04M 11/062 ; cable modems H04L 12/2801)} |
| | • PSTN means Public Switched Telephone Network | 12/40 | . . . | Bus networks |
| | • ISDN means Integrated Services Digital Network | 12/40006 | . . . | {Architecture of a communication node (current supply arrangements H04L 12/10 ; intermediate storage or scheduling H04L 49/90)} |
| | • TDM means Time-Division Multiplexing | | | NOTE |
| | • TDMA means Time Division Multiple Access } | | | { In this group the following terms or expressions are used with the meaning indicated: |
| 12/2858 | | | | • a bus controller is a microprocessor dedicated to input and output of data by a node on a bus; |
| 12/2859 | | | | • a bus master is a device controlling which node accesses the bus at a particular time; |
| 12/2861 | | | | • a bus guardian is a device monitoring the timing of node accesses on the bus; |
| 12/2863 | | | | • 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 | | | | |
| 12/2867 | | 12/40013 | | {Details regarding a bus controller} |
| | | 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 G06F 11/2002 ; error detection or correction of the data by redundancy in hardware using active fault-masking in storage systems using spares or by reconfiguring G06F 11/2053)} |
| 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 G06F 13/426)} | 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 H04L 12/2803 ; flow control H04L 47/10)} | 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 H04N 21/2381 , H04N 21/4363 , H04N 21/4381 ; packet switches H04L 49/00 ; intermediate storage or scheduling H04L 49/90)} | 2012/40208 | {characterized by the use of a particular bus standard} |
| 12/40078 | {Bus configuration (home automation networks H04L 12/2803 ; arrangements for maintenance or administration H04L 41/00)} | NOTE | |
| 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 H04L 12/462 ; single bridge functionality H04L 12/462)} | <ul style="list-style-type: none"> • 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; • 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; • Modbus designates a serial communications protocol published by Modicon in 1979 for use with its programmable logic controller; • LIN-Bus (Local Interconnect Network) designates a computer networking bus-system released in 1999 used within current automotive network architectures; • FlexRay designates an automotive network communications protocol developed by the FlexRay Consortium; • LON or LonWorks designates a network standard operating on twisted pair or electrical wiring or coaxial cable and used for building automation; • ASI or AS-Interface (Actuator Sensor Interface) designates the simplest of the industrial networking protocols used in programmable logic controller systems} | |
| 12/40097 | {Interconnection with other networks (LAN interconnection over a bridge based backbone H04L 12/462 ; single bridge functionality H04L 12/462)} | 2012/40215 | {Controller Area Network CAN} |
| 12/40104 | {Security; Encryption; Content protection (cryptographic protocols H04L 9/00 ; protocols for network security H04L 63/00)} | 2012/40221 | {Profibus} |
| 12/40117 | {Interconnection of audio or video/imaging devices (home automation networks H04L 12/2803 ; bitstream network arrangements specially adapted for distribution of digital video signals H04N 7/24)} | 2012/40228 | {Modbus} |
| 12/40123 | {Interconnection of computers and peripherals (printer information exchange with computer G06F 3/1293)} | 2012/40234 | {Local Interconnect Network LIN} |
| 12/4013 | {Management of data rate on the bus (systems modifying transmission characteristics according to link quality H04L 1/0001)} | 2012/40241 | {Flexray} |
| 12/40136 | {Nodes adapting their rate to the physical link properties (LAN switches H04L 49/351)} | 2012/40247 | {LON} |
| 12/40143 | {involving priority mechanisms (hybrid switching fabrics H04L 12/6402 ; intermediate storage or scheduling H04L 49/90 ; time-division multiplex systems H04J 3/00)} | 2012/40254 | {Actuator Sensor Interface ASI} |
| 12/4015 | {by scheduling the transmission of messages at the communication node} | 2012/4026 | {Bus for use in automation systems} |
| 12/40156 | {by using dedicated slots associated with a priority level} | | |
| 12/40163 | {by assigning priority to messages according to a message field} | | |
| 12/40169 | {Flexible bus arrangements (arrangements for maintenance or administration involving management of faults; events, alarms H04L 41/06 ; automatic restoration of network faults H04L 41/0654)} | | |

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|------------|-----------|--|---|
| 2012/40267 | . . . | {Bus for use in transportation systems} | as if they were attached to the same broadcast domain, regardless of their physical location. } |
| 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)} | |
| 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)} | |

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}

NOTES

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

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|-----------|--|-----------|--|
| 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 H04L 5/22) | 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 H04L 45/00, H04L 47/00) | 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}
- 2012/6405 . . . {Space}
- 2012/6408 . . . {Shared Medium, e.g. memory, bus, ring}
- 2012/641 . . . {Time switching}
- 2012/6413 . . . {Switch peripheries}
- 2012/6416 . . . {Switch multicast}
- 12/6418 . . {Hybrid transport}
- 2012/6421 . . . {Medium of transmission, e.g. fibre, cable, radio, satellite}
- 2012/6424 . . . {Access arrangements}
- 2012/6427 {Subscriber Access Module; Concentrator; Group equipment}
- 2012/6429 . . . {Terminal adapters}
- 2012/6432 . . . {Topology}
- 2012/6435 {Bus}
- 2012/6437 {Ring}
- 2012/644 {Star}
- 2012/6443 . . . {Network Node Interface, e.g. Routing, Path finding}
- 2012/6445 . . . {Admission control}
- 2012/6448 {Medium Access Control [MAC]}
- 2012/6451 {Deterministic, e.g. Token, DQDB}
- 2012/6454 {Random, e.g. Ethernet}
- 2012/6456 {Channel and bandwidth allocation}
- 2012/6459 {Multiplexing, e.g. TDMA, CDMA}
- 2012/6462 {Movable boundaries in packets or frames}
- 2012/6464 . . . {Priority}
- 2012/6467 . . . {Information loss recovery, e.g. error correction, prediction}
- 2012/647 . . . {Frame Relay, X.25}
- 2012/6472 . . . {Internet}
- 2012/6475 . . . {N-ISDN, Public Switched Telephone Network [PSTN]}
- 2012/6478 . . . {Digital subscriber line, e.g. DSL, ADSL, HDSL, XDSL, VDSL}
- 2012/6481 . . . {Speech, voice}
- 2012/6483 . . . {Video, e.g. MPEG}
- 2012/6486 . . . {Signalling Protocols}
- 2012/6489 . . . {Buffer Management, Threshold setting, Scheduling, Shaping}
- 2012/6491 . . . {Echo cancellation}
- 2012/6494 . . . {Silence suppression}
- 2012/6497 . . . {Feedback to the source}
- 12/66 . . Arrangements for connecting between networks having differing types of switching systems, e.g. gateways
- 13/00** **Details of the apparatus or circuits covered by groups [H04L 15/00](#) or [H04L 17/00](#)**
- 13/02 . . Details not particular to receiver or transmitter
- 13/04 . . Driving mechanisms; Clutches
- 13/06 . . Tape or page guiding or feeding devices
- 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}
- 13/188 . . {Projection of the printed matter}
- 15/00** **Apparatus or local circuits for transmitting or receiving dot-and-dash codes, e.g. Morse code (teaching apparatus therefor [G09B](#); telegraph tapping keys [H01H 21/86](#))**
- 15/03 . . Keys structurally combined with sound generators
- 15/04 . . Apparatus or circuits at the transmitting end
- 15/06 . . with a restricted number of keys, e.g. separate key for each type of code element
- 15/08 . . . with a single key which transmits dots in one position and dashes in a second position
- 15/10 . . . combined with perforating apparatus
- 15/12 . . with keyboard co-operating with code-bars
- 15/14 . . . combined with perforating apparatus
- 15/16 . . with keyboard co-operating with code discs
- 15/18 . . Automatic transmitters, e.g. controlled by perforated tape
- 15/20 . . . with optical sensing means
- 15/22 . . Apparatus or circuits for sending one or a restricted number of signals, e.g. distress signals
- 15/24 . . Apparatus or circuits at the receiving end
- 15/26 . . operating only on reception of predetermined code signals, e.g. distress signals, party-line call signals
- 15/28 . . Code reproducing apparatus
- 15/285 . . . {Telegraph sounders; Apparatus for acoustic reception}
- 15/30 . . . Writing recorders
- 15/32 . . . Perforating recorders
- 15/34 . . Apparatus for recording received coded signals after translation, e.g. as type-characters
- 17/00** **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**
- 17/02 . . Apparatus or circuits at the transmitting end
- 17/04 . . with keyboard co-operating with code-bars
- 17/06 . . . Contact operating means
- 17/08 . . . combined with perforating apparatus
- 17/10 . . with keyboard co-operating with code-discs
- 17/12 . . Automatic transmitters, e.g. controlled by perforated tape
- 17/14 . . . with optical sensing means
- 17/16 . . Apparatus or circuits at the receiving end
- 17/18 . . Code selection mechanisms
- 17/20 . . using perforating recorders
- 17/22 . . using mechanical translation and type-bar printing
- 17/24 . . using mechanical translation and type-head printing, e.g. type-wheel, type-cylinder
- 17/26 . . using aggregate motion translation
- 17/28 . . using pneumatic or hydraulic translation
- 17/30 . . using electric or electronic translation
- 19/00** **Apparatus or local circuits for step-by-step systems**
- 21/00** **Apparatus or local circuits for mosaic printer telegraph systems**
- 21/02 . . at the transmitting end
- 21/04 . . at the receiving end
- 23/00** **Apparatus or local circuits for systems other than those covered by groups [H04L 15/00](#) - [H04L 21/00](#)**

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

- 25/03159 {operating in the frequency domain
([H04L 25/03165](#), [H04L 25/03178](#) take precedence)}
- 25/03165 {using neural networks}
- 25/03171 {Arrangements involving maximum a posteriori probability [MAP] detection}
- NOTE**
- {This group contains provisionally all documents which deal with turbo equalisation.}
- 25/03178 {Arrangements involving sequence estimation techniques}
- 25/03184 {Details concerning the metric}
- 25/03191 {in which the receiver makes a selection between different metrics}
- 25/03197 {methods of calculation involving metrics}
- 25/03203 {Trellis search techniques}
- 25/0321 {Sorting arrangements therefor}
- 25/03216 {using the M-algorithm}
- 25/03222 {using the T-algorithm}
- 25/03229 {with state-reduction using grouping of states}
- 25/03235 {with state-reduction using feedback filtering}
- 25/03242 {Methods involving sphere decoding}
- 25/03248 {Arrangements for operating in conjunction with other apparatus}
- NOTE**
- {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.}
- 25/03254 {Operation with other circuitry for removing intersymbol interference}
- 25/03261 {with impulse-response shortening filters}
- 25/03267 {with decision feedback equalisers}
- 25/03273 {with carrier recovery circuitry}
- 25/0328 {with interference cancellation circuitry (adaptations for interference cancellation within a sequence estimator [H04L 25/03305](#); interference related aspects of direct sequence spread spectrum [H04B 1/7097](#); interference related aspects of frequency hopping spread spectrum [H04B 1/715](#); see also [H04B 1/10](#))}
- 25/03286 {with channel-decoding circuitry}
- 25/03292 {with channel estimation circuitry}
- 25/03299 {with noise-whitening circuitry}
- 25/03305 {Joint sequence estimation and interference removal (joint detection of several desired signals [H04L 25/03331](#))}
- 25/03312 {Arrangements specific to the provision of output signals}
- 25/03318 {Provision of soft decisions}
- 25/03324 {Provision of tentative decisions}
- 25/03331 {Arrangements for the joint estimation of multiple sequences}
- 25/03337 {Arrangements involving per-survivor processing}
- 25/03343 {Arrangements at the transmitter end}
- 2025/0335 {characterised by the type of transmission}
- 2025/03356 {Baseband transmission}
- 2025/03363 {Multilevel ([H04L 2025/03369](#) takes precedence)}
- 2025/03369 {Partial response}
- 2025/03375 {Passband transmission}
- 2025/03382 {Single of vestigial sideband}
- 2025/03388 {ASK}
- 2025/03394 {FSK}
- 2025/03401 {PSK}
- 2025/03407 {Continuous phase}
- 2025/03414 {Multicarrier}
- 2025/0342 {QAM}
- 2025/03426 {transmission using multiple-input and multiple-output channels}
- 2025/03433 {characterised by equaliser structure}
- 2025/03439 {Fixed structures}
- 2025/03445 {Time domain}
- 2025/03452 {Systolic arrays}
- 2025/03458 {Lattice}
- 2025/03464 {Neural networks}
- 2025/03471 {Tapped delay lines ([H04L 2025/03464](#) 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}
- 2025/03509 {fractionally spaced ([H04L 2025/03515](#) takes precedence)}
- 2025/03515 {irregularly spaced}
- 2025/03522 {Frequency domain}
- 2025/03528 {Other transform domain}
- 2025/03535 {Variable structures}
- 2025/03541 {Switching between domains, e.g. between time and frequency}
- 2025/03547 {Switching between time domain structures}
- 2025/03554 {between neural networks and tapped delay lines}
- 2025/0356 {Switching the time direction of equalisation}
- 2025/03566 {between different tapped delay line structures}
- 2025/03573 {between recursive and non-recursive}
- 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 ([H04L 2025/03643](#) takes precedence)}

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|----------------------|--|--------------------|--|
| 2025/03624 | {Zero-forcing} | 25/03904 | {cooperative design, e.g. exchanging of codebook information between base stations} |
| 2025/03663 | {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 H04L 1/0618)} |
| 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 H04L 1/0031 ; feedback for transmit diversity systems H04B 7/0619 ; selection of codebook or precoding matrix for MIMO diversity systems H04B 7/0456)} |
| 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 H04L 25/029 , H04L 25/0296)} |
| 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 (H04L 2025/03738 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 (H04L 25/068 and H04L 25/069 take precedence; sequence estimation techniques H04L 25/03178)} |
| 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 H04L 25/497)} | | |
| 25/03834 | {using pulse shaping} | | |
| 25/0384 | {Design of pulse shapes (pulse shape for impulse radio H04B 1/7172)} | | |
| 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 H04B 7/0413)} | | |
| 25/03898 | {codebook-based design (selection of codebook or precoding matrix for MIMO diversity systems H04B 7/0456)} | | |

- 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](#))}
- 2027/0016 . . {Stabilisation of local oscillators}
- 2027/0018 . . {Arrangements at the transmitter end}
- 2027/002 . . . {using feedback from a remote receiver}
- 2027/0022 . . . {using the carrier of the associated receiver of a transceiver}
- 2027/0024 . . {at the receiver end}
- 2027/0026 . . . {Correction of carrier offset}
- 2027/0028 {at passband only}
- 2027/003 {at baseband only}
- 2027/0032 {at baseband and passband}
- 2027/0034 {using hypothesis testing}
- 2027/0036 {using a recovered symbol clock}
- 2027/0038 {using an equaliser}
- 2027/004 {the equaliser providing control signals}
- 2027/0042 {the equaliser providing the offset correction *per se*}
- 2027/0044 . . {Control loops for carrier regulation}
- 2027/0046 . . . {Open loops}
- 2027/0048 {Frequency multiplication}
- 2027/0051 {Harmonic tracking}
- 2027/0053 . . . {Closed loops}
- 2027/0055 {single phase}
- 2027/0057 {quadrature phase}
- 2027/0059 {more than two phases}
- 2027/0061 {remodulation}
- 2027/0063 . . . {Elements of loops}
- 2027/0065 {Frequency error detectors ([H04L 2027/0067](#) takes precedence)}
- 2027/0067 {Phase error detectors}
- 2027/0069 {Loop filters}
- 2027/0071 . . . {Control of loops}
- 2027/0073 {Detection of synchronisation state}
- 2027/0075 {Error weighting}
- 2027/0077 {stop and go}
- 2027/0079 {Switching between loops}
- 2027/0081 {between loops of different bandwidths}
- 2027/0083 . . {Signalling arrangements}
- 2027/0085 . . . {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 (H04L 27/201 takes precedence)} |
| 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 (H04L 27/201 takes precedence)} |
| 27/01 | . Equalisers {(baseband equalizers at the transmitter end H04L 25/03343 ; in analogue transmission systems H04B 3/04 , H04B 7/005)} | | |
| 27/02 | . Amplitude-modulated carrier systems, e.g. using on-off keying; Single sideband or vestigial sideband modulation (H04L 27/32 takes precedence) | 27/2021 | {in which the phase change per symbol period is not constrained} |
| 27/04 | . . Modulator circuits; Transmitter circuits | 27/2025 | {in which the phase changes in a piecewise linear manner within each symbol period} |
| 27/06 | . . Demodulator circuits; Receiver circuits | | |
| 27/063 | . . . {Superheterodyne receivers} | 27/2028 | {in which the phase changes are non-linear} |
| 27/066 | . . . {Carrier recovery circuits (H04L 27/2271 takes precedence)} | 27/2032 | . . . {for discrete phase modulation, e.g. in which the phase of the carrier is modulated in a nominally instantaneous manner} |
| 27/08 | . . Amplitude regulation arrangements | 27/2035 | {using a single or unspecified number of carriers} |
| 27/10 | . Frequency-modulated carrier systems, i.e. using frequency-shift keying (H04L 27/32 takes precedence) | 27/2039 | {using microwave technology} |
| 27/103 | . . {Chirp modulation (for spread spectrum techniques H04B 1/69)} | 27/2042 | {with more than two phase states} |
| 27/106 | . . {M-ary FSK} | 27/2046 | {in which the data are represented by carrier phase} |
| 27/12 | . . Modulator circuits; Transmitter circuits | 27/205 | {in which the data are represented by the change in phase of the carrier} |
| 27/122 | . . . {using digital generation of carrier signals (digital function generators G06F 1/02 , H04L 17/10 ; generating pulses having stepped portions using digital techniques H03K 4/026)} | 27/2053 | {using more than one carrier, e.g. carriers with different phases} |
| 27/125 | . . . {using a controlled oscillator in an open loop} | 27/2057 | {with a separate carrier for each phase state} |
| 27/127 | . . . {using a controlled oscillator in a feedback loop} | 27/206 | {using a pair of orthogonal carriers, e.g. quadrature carriers} |
| 27/14 | . . Demodulator circuits; Receiver circuits | 27/2064 | {using microwave technology} |
| 27/142 | . . . {Compensating direct current components occurring during the demodulation and which are caused by mistuning} | 27/2067 | {with more than two phase states (H04L 27/2064 takes precedence)} |
| 27/144 | . . . with demodulation using spectral properties of the received signal, e.g. by using frequency selective- or frequency sensitive elements | 27/2071 | {in which the data are represented by the carrier phase, e.g. systems with differential coding} |
| 27/148 | using filters, including PLL-type filters | 27/2075 | {in which the data are represented by the change in carrier phase} |
| 27/152 | using controlled oscillators, e.g. PLL arrangements | 27/2078 | {in which the phase change per symbol period is constrained (coset coding H04L 27/186)} |
| 27/1525 | {using quadrature demodulation} | | |
| 27/156 | . . . with demodulation using temporal properties of the received signal, e.g. detecting pulse width | 27/2082 | {for offset or staggered quadrature phase shift keying} |
| 27/1563 | {using transition or level detection} | 27/2085 | {with more than one phase shift per symbol period} |
| 27/1566 | {using synchronous sampling} | 27/2089 | {with unbalanced quadrature channels} |
| 27/16 | . . Frequency regulation arrangements | 27/2092 | {with digital generation of the modulated carrier (does not include the modulation of a digitally generated carrier)} |
| 27/18 | . Phase-modulated carrier systems, i.e. using phase-shift keying (H04L 27/32 takes precedence) | 27/2096 | . . . {Arrangements for directly or externally modulating an optical carrier (optical modulation H04B 10/503)} |
| 27/183 | . . {Multiresolution systems} | 27/22 | . . Demodulator circuits; Receiver circuits |
| 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} | 27/223 | . . . {Demodulation in the optical domain (optical demodulation H04B 10/676)} |
| 27/20 | . . Modulator circuits; Transmitter circuits | 27/227 | . . . using coherent demodulation |
| 27/2003 | . . . {for continuous phase modulation (frequency shift keying H04L 27/10)} | 27/2271 | {wherein the carrier recovery circuit uses only the demodulated signals} |
| 27/2007 | {in which the phase change within each symbol period is constrained (coset coding H04L 27/186)} | | |
| 27/201 | {in which the allowed phase changes vary with time, e.g. multi-h modulation} | | |

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

| | | | | | |
|----------|-----------|---|----------|-----------|--|
| 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 (wavelet-division H04L 5/0008)} | 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 (synchronisation arrangements H04L 27/2655)} | 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 (channel estimation H04L 25/0202)} |
| 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 H04L 27/02 , H04L 27/10 , H04L 27/18 or H04L 27/26 |
| 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}
- 27/3433 {using an underlying square constellation}
- 27/3438 {using an underlying generalised cross constellation}
- 27/3444 {by applying a certain rotation to regular constellations}
- 27/345 {Modifications of the signal space to allow the transmission of additional information}
- 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}
- 27/3461 {in order to transmit a subchannel}
- 27/3466 {by providing an alternative to one signal point}
- 27/3472 {by switching between alternative constellations}
- 27/3477 {by using the outer points of the constellation or of the constituent two-dimensional constellations}
- 27/3483 {using a modulation of the constellation points}
- 27/3488 {Multiresolution systems}
- 27/3494 {using non - square modulating pulses, e.g. using raised cosine pulses; Partial response QAM, i.e. with partial response pulse shaping (QAM over partial response channels [H04L 25/497](#))}
- 27/36 Modulator circuits; Transmitter circuits
- 27/361 {Modulation using a single or unspecified number of carriers, e.g. with separate stages of phase and amplitude modulation}
- 27/362 {Modulation using more than one carrier, e.g. with quadrature carriers, separately amplitude modulated ([H04L 27/366](#) takes precedence)}
- 27/363 {using non - square modulating pulses, modulators specifically designed for this (transmission of non - square QAM [H04L 27/3494](#))}
- 27/364 {Arrangements for overcoming imperfections in the modulator, e.g. quadrature error or unbalanced I and Q levels}
- 27/365 {Modulation using digital generation of the modulated carrier (not including modulation of a digitally generated carrier)}
- 27/366 {Arrangements for compensating undesirable properties of the transmission path between the modulator and the demodulator}
- 27/367 {using predistortion}
- 27/368 {adaptive predistortion}
- 27/38 Demodulator circuits; Receiver circuits
- 27/3809 {Amplitude regulation arrangements}
- 27/3818 {using coherent demodulation, i.e. using one or more nominally phase synchronous carriers ([H04L 27/227](#) and [H04L 27/389](#) take precedence)}
- 27/3827 {in which the carrier is recovered using only the demodulated baseband signals}
- 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}
- 27/3845 {using non - coherent demodulation, i.e. not using a phase synchronous carrier}
- 27/3854 {using a non - coherent carrier, including systems with baseband correction for phase or frequency offset}
- 27/3863 {Compensation for quadrature error in the received signal}
- 27/3872 {Compensation for phase rotation in the demodulated signal}
- 27/3881 {using sampling and digital processing, not including digital systems which imitate heterodyne or homodyne demodulation}
- 27/389 {with separate demodulation for the phase and amplitude components}
- 41/00 Arrangements for maintenance, administration or management of data switching networks, e.g. of packet switching networks**
- 41/02 Standardisation; Integration
- 41/0213 Standardised network management protocols, e.g. simple network management protocol [SNMP]
- 41/022 Multivendor or multi-standard integration
- 41/0226 Mapping or translating multiple network management protocols
- 41/0233 Object-oriented techniques, for representation of network management data, e.g. common object request broker architecture [CORBA]
- 41/024 {using relational databases for representation of network management data, e.g. managing via structured query language [SQL]}
- 41/0246 Exchanging or transporting network management information using the Internet; Embedding network management web servers in network elements; Web-services-based protocols
- 41/0253 using browsers or web-pages for accessing management information
- 41/026 using e-messaging for transporting management information, e.g. email, instant messaging or chat
- 41/0266 using meta-data, objects or commands for formatting management information, e.g. using eXtensible markup language [XML]
- 41/0273 using web services for network management, e.g. simple object access protocol [SOAP]
- 41/028 {for synchronisation between service call and response}
- 41/0286 {for search or classification or discovery of web services providing management functionalities}
- 41/0293 {for accessing web services by means of a binding identification of the management service or element}
- 41/04 Network management architectures or arrangements
- 41/042 comprising distributed management centres cooperatively managing the network
- 41/044 comprising hierarchical management structures
- 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}
- 41/28 . Restricting access to network management systems or functions, e.g. using authorisation function to access network configuration
- 41/30 . {Decision processes by autonomous network management units using voting and bidding}
- 41/32 . {Specific management aspects for broadband networks}
- 41/34 . Signalling channels for network management communication
- 41/342 . . between virtual entities, e.g. orchestrators, SDN or NFV entities
- 41/344 . . Out-of-band transfers
- 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
- 41/5003 . . Managing SLA; Interaction between SLA and QoS
- 41/5006 . . . Creating or negotiating SLA contracts, guarantees or penalties
- 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]
- 41/5012 {determining service availability, e.g. which services are available at a certain point in time}
- 41/5016 {based on statistics of service availability, e.g. in percentage or over a given time}
- 41/5019 . . . Ensuring fulfilment of SLA
- 41/5022 by giving priorities, e.g. assigning classes of service
- 41/5025 by proactively reacting to service quality change, e.g. by reconfiguration after service quality degradation or upgrade
- 41/5029 . . {Service quality level-based billing, e.g. dependent on measured service level customer is charged more or less}
- 41/5032 . . {Generating service level reports}
- 41/5041 . . characterised by the time relationship between creation and deployment of a service
- 41/5045 . . . {Making service definitions prior to deployment}
- 41/5048 . . . {Automatic or semi-automatic definitions, e.g. definition templates}
- 41/5051 . . . Service on demand, e.g. definition and deployment of services in real time
- 41/5054 . . . Automatic deployment of services triggered by the service manager, e.g. service implementation by automatic configuration of network components
- 41/5058 . . {Service discovery by the service manager}
- 41/5061 . . characterised by the interaction between service providers and their network customers, e.g. customer relationship management
- 41/5064 . . . {Customer relationship management}
- 41/5067 . . . Customer-centric QoS measurements
- 41/507 . . . Filtering out customers affected by service problems
- 41/5074 . . . Handling of user complaints or trouble tickets
- 41/5077 . . {wherein the managed service relates to simple transport services, i.e. providing only network infrastructure}
- 41/508 . . {based on type of value added network service under agreement}
- 41/5083 . . . {wherein the managed service relates to web hosting}
- 41/5087 . . . {wherein the managed service relates to voice services (management of VoIP services H04M 7/0081)}
- 41/509 . . . {wherein the managed service relates to media content delivery, e.g. audio, video or TV}
- 41/5093 . . . {wherein the managed service relates to messaging or chat services}
- 41/5096 . . . {wherein the managed service relates to distributed or central networked applications}
- 43/00 Arrangements for monitoring or testing data switching networks**
- 43/02 . Capturing of monitoring data
- 43/022 . . by sampling
- 43/024 . . . by adaptive sampling
- 43/026 . . using flow identification
- 43/028 . . by filtering
- 43/04 . Processing captured monitoring data, e.g. for logfile generation
- 43/045 . . for graphical visualisation of monitoring data
- 43/06 . Generation of reports
- 43/062 . . related to network traffic
- 43/065 . . related to network devices
- 43/067 . . using time frame reporting
- 43/08 . Monitoring or testing based on specific metrics, e.g. QoS, energy consumption or environmental parameters
- 43/0805 . . by checking availability
- 43/0811 . . . by checking connectivity
- 43/0817 . . . by checking functioning
- 43/0823 . . Errors, e.g. transmission errors
- 43/0829 . . . Packet loss
- 43/0835 {One way packet loss}
- 43/0841 {Round trip packet loss}
- 43/0847 . . . {Transmission error}
- 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
- 43/20 . the monitoring system or the monitored elements being virtualised, abstracted or software-defined entities, e.g. SDN or NFV
- 43/50 . Testing arrangements
- 43/55 . . Testing of service level quality, e.g. simulating service usage
- 45/00 Routing or path finding of packets in data switching networks (routing or path finding in wireless networks [H04W 40/00](#))**
- 45/02 . Topology update or discovery
- 45/021 . . Ensuring consistency of routing table updates, e.g. by using epoch numbers
- 45/023 . . Delayed use of routing table updates
- 45/025 . . {Updating only a limited number of routers, e.g. fish-eye update}
- 45/026 . . {Details of "hello" or keep-alive messages}
- 45/028 . . Dynamic adaptation of the update intervals, e.g. event-triggered updates
- 45/03 . . by updating link state protocols
- 45/033 . . by updating distance vector protocols
- 45/036 . . Updating the topology between route computation elements, e.g. between OpenFlow controllers
- 45/037 . . . Routes obligatorily traversing service-related nodes
- 45/0377 for service chaining
- 45/04 . . {Interdomain routing, e.g. hierarchical routing}
- 45/06 . . {Deflection routing, e.g. hot-potato routing}
- 45/08 . . {Learning-based routing, e.g. using neural networks or artificial intelligence}
- 45/10 . . {Routing in connection-oriented networks, e.g. X.25 or ATM}
- 45/12 . Shortest path evaluation
- 45/121 . . by minimising delays
- 45/122 . . by minimising distances, e.g. by selecting a route with minimum of number of hops
- 45/123 . . {Evaluation of link metrics (techniques for monitoring network metrics [H04L 43/08](#))}
- 45/124 . . {using a combination of metrics}
- 45/125 . . based on throughput or bandwidth
- 45/126 . . {minimising geographical or physical path length}
- 45/127 . . {based on intermediate node capabilities}
- 45/128 . . for finding disjoint paths
- 45/1283 . . . {with disjoint links}
- 45/1287 . . . {with disjoint nodes}
- 45/14 . {Routing performance; Theoretical aspects}
- 45/16 . Multipoint routing
- 45/17 . Shortcut routing, e.g. using next hop resolution protocol [NHRP]
- 45/18 . Loop-free operations
- 45/20 . {Hop count for routing purposes, e.g. TTL}
- 45/22 . {Alternate routing}
- 45/24 . Multipath
- 45/243 . . using M+N parallel active paths
- 45/245 . . {Link aggregation, e.g. trunking}
- 45/247 . . using M:N active or standby paths
- 45/26 . {Route discovery packet}
- 45/28 . using route fault recovery
- 45/30 . Routing of multiclass traffic
- 45/302 . Route determination based on requested QoS
- 45/304 . . {Route determination for signalling traffic}
- 45/306 . . {Route determination based on the nature of the carried application}
- 45/3065 . . . {for real time traffic}
- 45/308 . . {Route determination based on user's profile, e.g. premium users}
- 45/32 . {Flooding (denial of service attacks [H04L 63/1458](#))}
- 45/34 . {Source routing}
- 45/36 . {Backward learning}
- 45/38 . {Flow based routing}
- 45/40 . {Wormhole routing}
- 45/42 . Centralised routing
- 45/44 . Distributed routing
- 45/46 . {Cluster building}
- 45/48 . Routing tree calculation
- 45/484 . . using multiple routing trees
- 45/488 . . using root node determination
- 45/50 . using label swapping, e.g. multi-protocol label switch [MPLS]
- 45/502 . . {Frame based}
- 45/505 . . {Cell based}
- 45/507 . . {Label distribution}
- 45/52 . Multiprotocol routers
- 45/54 . {Organization of routing tables}
- 45/56 . {Routing software}
- 45/563 . . {Software download or update}
- 45/566 . . {Routing instructions carried by the data packet, e.g. active networks}
- 45/58 . Association of routers
- 45/583 . . {Stackable routers}
- 45/586 . . of virtual routers
- 45/60 . Router architectures
- 45/62 . {Wavelength based (optical switching [H04Q 11/0062](#))}
- 45/64 . using an overlay routing layer
- 45/645 . Splitting route computation layer and forwarding layer, e.g. routing according to path computational element [PCE] or based on OpenFlow functionality
- 45/655 . . Interaction between route computation entities and forwarding entities, e.g. for route determination or for flow table update
- 45/66 . {Layer 2 routing, e.g. in Ethernet based MAN's}
- 45/68 . {Pseudowire emulation, e.g. IETF WG PWE3}
- 45/70 . {Routing based on monitoring results}
- 45/72 . {Routing based on the source address}
- 45/74 . Address processing for routing
- 45/741 . . Routing in networks with a plurality of addressing schemes, e.g. with both IPv4 and IPv6
- 45/742 . . {Route cache; Operation thereof}
- 45/745 . . Address table lookup; Address filtering
- 45/7452 . . . Multiple parallel or consecutive lookup operations (lookup operation involving Bloom filters [H04L 45/7459](#))
- 45/7453 using hashing
- 45/7459 using Bloom filters
- 45/74591 . . . {using content-addressable memories [CAM]}
- 45/748 . . . using longest matching prefix
- 45/76 . Routing in software-defined topologies, e.g. routing between virtual machines
- 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
- 47/00** **Traffic control in data switching networks**
(arrangements for detecting or preventing errors in the information received [H04L 1/00](#))
- NOTE**
- This group covers:
1. Flow control or congestion control
 2. Queue scheduling
 3. Admission control or resource allocation
- 47/10 . Flow control; Congestion control
- 47/11 . . Identifying congestion
- 47/115 . . . {using a dedicated packet}
- 47/12 . . Avoiding congestion; Recovering from congestion
- 47/122 . . . by diverting traffic away from congested entities
- 47/125 . . . by balancing the load, e.g. traffic engineering
- 47/127 . . . by using congestion prediction
- 47/129 . . . at the destination endpoint, e.g. reservation of terminal resources or buffer space
- 47/13 . . {in a LAN segment, e.g. ring or bus}
- 47/135 . . . {by jamming the transmission media}
- 47/15 . . {in relation to multipoint traffic (arrangements for broadcast or multicast in data networks [H04L 12/18](#))}
- 47/16 . . {in connection oriented networks, e.g. frame relay}
- 47/17 . . Interaction among intermediate nodes, e.g. hop by hop
- 47/18 . . {End to end}
- 47/19 . . at layers above the network layer (network arrangements for networked applications for scheduling or organising the servicing of application requests [H04L 67/60](#))
- 47/193 . . . at the transport layer, e.g. TCP related
- 47/196 . . . {Integration of transport layer protocols, e.g. TCP and UDP}
- 47/20 . . Traffic policing
- 47/21 . . using leaky-bucket
- 47/215 . . using token-bucket
- 47/22 . . Traffic shaping
- 47/225 . . . {Determination of shaping rate, e.g. using a moving window}
- 47/23 . . {Bit dropping}
- 47/24 . . Traffic characterised by specific attributes, e.g. priority or QoS
- 47/2408 . . . for supporting different services, e.g. a differentiated services [DiffServ] type of service
- 47/2416 . . . Real-time traffic
- 47/2425 . . . for supporting services specification, e.g. SLA
- 47/2433 {Allocation of priorities to traffic types}
- 47/2441 . . . relying on flow classification, e.g. using integrated services [IntServ]
- 47/245 . . . {using preemption}
- 47/2458 . . . {Modification of priorities while in transit}
- 47/2466 . . . using signalling traffic
- 47/2475 . . . for supporting traffic characterised by the type of applications
- 47/2483 . . . involving identification of individual flows
- 47/2491 . . . Mapping quality of service [QoS] requirements between different networks
- 47/25 . . with rate being modified by the source upon detecting a change of network conditions
- 47/26 . . using explicit feedback to the source, e.g. choke packets
- 47/263 . . . Rate modification at the source after receiving feedback
- 47/265 . . . sent by intermediate network nodes
- 47/266 . . . {Stopping or restarting the source, e.g. X-on or X-off}
- 47/267 . . . sent by the destination endpoint (network streaming of media packets with control of the source by the destination [H04L 65/613](#))
- 47/27 . . Evaluation or update of window size, e.g. using information derived from acknowledged [ACK] packets
- 47/28 . . in relation to timing considerations
- 47/283 . . . in response to processing delays, e.g. caused by jitter or round trip time [RTT]
- 47/286 . . . {Time to live}
- 47/29 . . {using a combination of thresholds}
- 47/30 . . in combination with information about buffer occupancy at either end or at transit nodes
- 47/31 . . by tagging of packets, e.g. using discard eligibility [DE] bits
- 47/32 . . by discarding or delaying data units, e.g. packets or frames
- 47/323 . . . {Discarding or blocking control packets, e.g. ACK packets}
- 47/326 . . . {with random discard, e.g. random early discard [RED]}
- 47/33 . . using forward notification
- 47/34 . . ensuring sequence integrity, e.g. using sequence numbers
- 47/35 . . by embedding flow control information in regular packets, e.g. piggybacking
- 47/36 . . by determining packet size, e.g. maximum transfer unit [MTU]
- 47/365 . . . {Dynamic adaptation of the packet size}
- 47/37 . . . {Slow start}
- 47/38 . . by adapting coding or compression rate
- 47/39 . . . {Credit based}
- 47/40 . . using split connections
- 47/41 . . by acting on aggregated flows or links
- 47/43 . . Assembling or disassembling of packets, e.g. segmentation and reassembly [SAR]
- 47/431 . . . using padding or de-padding
- 47/50 . Queue scheduling
- 47/52 . . by attributing bandwidth to queues
- 47/521 . . . {Static queue service slot or fixed bandwidth allocation}
- 47/522 . . . {Dynamic queue service slot or variable bandwidth allocation}
- 47/524 {Queue skipping}
- 47/525 . . . by redistribution of residual bandwidth
- 47/527 . . . {Quantum based scheduling, e.g. credit or deficit based scheduling or token bank}
- 47/528 . . . {Minimum bandwidth guarantee}
- 47/54 . . {Loss aware scheduling}
- 47/56 . . implementing delay-aware scheduling
- 47/562 . . . {Attaching a time tag to queues}

- 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 |
| 61/00 | Network arrangements, protocols or services for addressing or naming | 61/2596 | . . . Translation of addresses of the same type other than IP, e.g. translation from MAC to MAC addresses |
| | NOTE | 61/30 | . Managing network names, e.g. use of aliases or nicknames (name-to-address mapping H04L 61/45) |
| | This group <u>does not cover</u> : | 61/3005 | . . {Mechanisms for avoiding name conflicts} |
| | . {aspects relating to switching or routing which are covered by groups H04L 45/00 or H04L 49/00 ;} | 61/301 | . . Name conversion |
| | . {aspects relating to configuration management of data networks or network elements in general, which are covered by group H04L 41/08 } | 61/3015 | . . Name registration, generation or assignment |
| | . {aspects of addressing in telephony which are covered by group H04M 7/00 ;} | 61/302 | . . . {Administrative registration, e.g. for domain names at internet corporation for assigned names and numbers [ICANN]} |
| | . {aspects of addressing within devices, e.g. process or memory, which are covered by groups G06F 13/42 or G06F 12/00 . } | 61/3025 | . . . {Domain name generation or assignment} |
| 61/09 | . Mapping addresses | 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} |
| 61/10 | . . of different types | 61/45 | . Network directories; Name-to-address mapping |
| 61/103 | . . . across network layers, e.g. resolution of network layer into physical layer addresses or address resolution protocol [ARP] | 61/4505 | . . using standardised directories; using standardised directory access protocols |
| 61/106 | . . . across networks, e.g. mapping telephone numbers to data network addresses | 61/4511 | . . . using domain name system [DNS] |
| 61/25 | . . of the same type | 61/4517 | . . . using open systems interconnection [OSI] directories, e.g. X.500 |
| | | 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

H04L 67/00
(continued)

| | | | |
|----------|--|---------|--|
| | application layer protocols, e.g. FTP, WAP, HTTP. | 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)} |
| 2. | This group <u>does not cover</u> : | | |
| 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 | 67/1046 | {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)} |
| 67/01 | . Protocols | 67/1057 | {involving pre-assessment of levels of reputation of peers} |
| 67/02 | . . based on web technology, e.g. hypertext transfer protocol [HTTP] | 67/1059 | {Inter-group management mechanisms, e.g. splitting, merging or interconnection of groups} |
| 67/025 | . . . for remote control or remote monitoring of applications | 67/1061 | using node-based peer discovery mechanisms (static access to replicated servers H04L 67/1006 ; service discovery H04L 67/51) |
| 67/04 | . . specially adapted for terminals or networks with limited capabilities; specially adapted for terminal portability | 67/1063 | {Discovery through centralising entities} |
| 67/06 | . . specially adapted for file transfer, e.g. file transfer protocol [FTP] | 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)} |
| 67/08 | . . specially adapted for terminal emulation, e.g. Telnet | 67/1068 | {Discovery involving direct consultation or announcement among potential requesting and potential source peers} |
| 67/10 | . . in which an application is distributed across nodes in the network (software deployment G06F 8/60 ; multiprogramming arrangements G06F 9/46) | 67/107 | {with limitation or expansion of the discovery scope} |
| 67/1001 | . . . for accessing one among a plurality of replicated servers | 67/1072 | {Discovery involving ranked list compilation of candidate peers} |
| 67/10015 | {Access to distributed or replicated servers, e.g. using brokers} | 67/1074 | for supporting data block transmission mechanisms (file transfer H04L 67/06) |
| 67/1004 | Server selection for load balancing | 67/1076 | {Resource dissemination mechanisms or network resource keeping policies for optimal resource availability in the overlay network} |
| 67/1006 | with static server selection, e.g. the same server being selected for a specific client | 67/1078 | {Resource delivery mechanisms} |
| 67/1008 | based on parameters of servers, e.g. available memory or workload (monitoring of computer activity G06F 11/30) | 67/108 | {characterised by resources being split in blocks or fragments} |
| 67/101 | based on network conditions | 67/1082 | {involving incentive schemes} |
| 67/1012 | based on compliance of requirements or conditions with available server resources | 67/1085 | {involving dynamic management of active down- or uploading connections} |
| 67/1014 | based on the content of a request | 67/1087 | using cross-functional networking aspects |
| 67/1017 | based on a round robin mechanism | 67/1089 | {Hierarchical topologies} |
| 67/1019 | Random or heuristic server selection | 67/1091 | {Interfacing with client-server systems or between P2P systems} |
| 67/1021 | based on client or server locations | 67/1093 | {Some peer nodes performing special functions} |
| 67/1023 | based on a hash applied to IP addresses or costs | 67/1095 | Replication or mirroring of data, e.g. scheduling or transport for data synchronisation between network nodes |
| 67/1025 | Dynamic adaptation of the criteria on which the server selection is based | 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] |
| 67/1027 | 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 | | |

- 67/12 . . 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
- 69/16 . Implementation or adaptation of Internet protocol [IP], of transmission control protocol [TCP] or of user datagram protocol [UDP]
- 69/161 . . {Implementation details of TCP/IP or UDP/IP stack architecture; Specification of modified or new header fields}
- 69/162 . . . {involving adaptations of sockets based mechanisms (secure socket layer [H04L 63/168](#))}
- 69/163 . . In-band adaptation of TCP data exchange; In-band control procedures
- 69/164 . . Adaptation or special uses of UDP protocol
- 69/165 . . Combined use of TCP and UDP protocols; selection criteria therefor
- 69/166 . . IP fragmentation; TCP segmentation
- 69/167 . . Adaptation for transition between two IP versions, e.g. between IPv4 and IPv6 ([translation of Internet protocol \[IP\] addresses H04L 61/2503](#))
- 69/168 . . specially adapted for link layer protocols, e.g. asynchronous transfer mode [ATM], synchronous optical network [SONET] or point-to-point protocol [PPP]
- 69/169 . . {Special adaptations of TCP, UDP or IP for interworking of IP based networks with other networks (protocols for interworking, protocol conversion [H04L 69/08](#))}
- 69/18 . Multiprotocol handlers, e.g. single devices capable of handling multiple protocols
- 69/22 . Parsing or analysis of headers
- 69/24 . Negotiation of communication capabilities
- 69/26 . {Special purpose or proprietary protocols or architectures (network applications for proprietary or special purpose networking environments [H04L 67/12](#))}
- 69/28 . Timers or timing mechanisms used in protocols
- 69/30 . Definitions, standards or architectural aspects of layered protocol stacks
- 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
- 69/321 . . . Interlayer communication protocols or service data unit [SDU] definitions; Interfaces between layers
- 69/322 . . . Intralayer communication protocols among peer entities or protocol data unit [PDU] definitions
- 69/323 in the physical layer [OSI layer 1]
- 69/324 in the data link layer [OSI layer 2], e.g. HDLC
- 69/325 in the network layer [OSI layer 3], e.g. X.25 ([H04L 69/16 takes precedence](#))
- 69/326 in the transport layer [OSI layer 4] ([H04L 69/16 takes precedence](#))
- 69/327 in the session layer [OSI layer 5]
- 69/328 in the presentation layer [OSI layer 6]
- 69/329 in the application layer [OSI layer 7]
- 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 ([management of faults, events, alarms or notifications in data switching networks H04L 41/06](#))
- 2101/00 Indexing scheme associated with group [H04L 61/00](#)**
- 2101/30 . Types of network names
- 2101/32 . . containing non-Latin characters, e.g. Chinese domain names
- 2101/33 . . containing protocol addresses or telephone numbers
- 2101/345 . . containing wildcard characters
- 2101/35 . . containing special prefixes
- 2101/355 . . containing special suffixes
- 2101/365 . . Application layer names, e.g. buddy names, unstructured names chosen by a user or home appliance name
- 2101/37 . . E-mail addresses
- 2101/375 . . Access point names [APN]
- 2101/38 . . Telephone uniform resource identifier [URI]
- 2101/385 . . Uniform resource identifier for session initiation protocol [SIP URI]
- 2101/39 . . Globally routable user-agent uniform resource identifier [GRUU] for the session initiation protocol [SIP]
- 2101/395 . . Internet protocol multimedia private identity [IMPI]; Internet protocol multimedia public identity [IMPU]
- 2101/60 . Types of network addresses
- 2101/604 . . Address structures or formats
- 2101/618 . . Details of network addresses
- 2101/622 . . . Layer-2 addresses, e.g. medium access control [MAC] addresses
- 2101/627 . . . Controller area network [CAN] identifiers
- 2101/631 . . . Small computer system interface [SCSI] addresses
- 2101/636 . . . IEEE1394 identification numbers
- 2101/64 . . . Asynchronous transfer mode [ATM] addresses
- 2101/645 . . . Fibre channel identifiers
- 2101/65 . . . Telephone numbers
- 2101/654 . . . International mobile subscriber identity [IMSI] numbers
- 2101/659 . . . Internet protocol version 6 [IPv6] addresses
- 2101/663 . . . Transport layer addresses, e.g. aspects of transmission control protocol [TCP] or user datagram protocol [UDP] ports
- 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 Algorithms used for the adjustment of time-domain equalizers**
- 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 [H04L 2201/02](#) - [H04L 2201/06](#)

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 management [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