

CPC COOPERATIVE PATENT CLASSIFICATION

H ELECTRICITY

(NOTE omitted)

H04 ELECTRIC COMMUNICATION TECHNIQUE

(NOTE omitted)

H04B TRANSMISSION

NOTE

This subclass covers the transmission of information-carrying signals, the transmission being independent of the nature of the information, and includes monitoring and testing arrangements and the suppression and limitation of noise and interference.

WARNING

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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| <p>1/00 Details of transmission systems, not covered by a single one of groups H04B 3/00 - H04B 13/00; Details of transmission systems not characterised by the medium used for transmission</p> <p>NOTE</p> <p>In this group, group H04B 1/0003 takes precedence over groups H04B 1/005 - H04B 1/76</p> | <p>1/0035 . . . {Channel filtering, i.e. selecting a frequency channel within a software radio system (multiplexing of multicarrier modulation signals being represented by different frequencies H04L 5/06; multiplexing of multicarrier modulation signals H04L 5/023)}</p> <p>1/0039 . . . {using DSP [Digital Signal Processor] quadrature modulation and demodulation}</p> <p>1/0042 . . . {Digital filtering (H04B 1/0035 takes precedence; digital filters <i>per se</i> H03H 17/00)}</p> <p>1/0046 . . . {Decimation, i.e. data rate reduction techniques}</p> <p>1/005 . . . {adapting radio receivers, transmitters and transceivers for operation on two or more bands, i.e. frequency ranges}</p> <p>1/0053 . . . {with common antenna for more than one band}</p> <p>1/0057 . . . {using diplexing or multiplexing filters for selecting the desired band}</p> <p>1/006 . . . {using switches for selecting the desired band (H04B 1/0057 takes precedence)}</p> <p>1/0064 . . . {with separate antennas for the more than one band (H04B 1/0053 takes precedence)}</p> <p>1/0067 . . . {with one or more circuit blocks in common for different bands}</p> <p>1/0071 . . . {using a common intermediate frequency for more than one band (H04B 1/0075 takes precedence)}</p> <p>1/0075 . . . {using different intermediate frequencied for the different bands}</p> <p>1/0078 {with a common intermediate frequency amplifier for the different intermediate frequencies, e.g. when using switched intermediate frequency filters}</p> <p>1/0082 {with a common local oscillator for more than one band}</p> <p>1/0085 {where one band is the image frequency band of the other and the band selection is done by image rejection}</p> <p>1/0089 {using a first intermediate frequency higher than the highest of any band received}</p> <p>1/0092 {using a wideband front end}</p> <p>1/0096 . . . {where a full band is frequency converted into another full band}</p> |
| <p>1/0003 . . . {Software-defined radio [SDR] systems, i.e. systems wherein components typically implemented in hardware, e.g. filters or modulators/demodulators, are implented using software, e.g. by involving an AD or DA conversion stage such that at least part of the signal processing is performed in the digital domain (digital baseband systems H04L 25/00; digital modulation/demodulation H04L 27/00; CDMA H04B 1/707; TDMA H04B 7/2643; image transmission H04N 5/00)}</p> <p>1/0007 . . . {wherein the AD/DA conversion occurs at radiofrequency or intermediate frequency stage}</p> <p>1/001 . . . {Channel filtering, i.e. selecting a frequency channel within the SDR system (multiplexing of multicarrier modulation signals being represented by different frequencies H04L 5/06; multiplexing of multicarrier modulation signals H04L 5/023)}</p> <p>1/0014 . . . {using DSP [Digital Signal Processor] quadrature modulation and demodulation}</p> <p>1/0017 . . . {Digital filtering (H04B 1/001 takes precedence; digital filters <i>per se</i> H03H 17/00)}</p> <p>1/0021 . . . {Decimation, i.e. data rate reduction techniques (H04B 1/0025 takes precedence)}</p> <p>1/0025 . . . {using a sampling rate lower than twice the highest frequency component of the sampled signal (for demodulation of angle-modulated signals H03D 3/006)}</p> <p>1/0028 . . . {wherein the AD/DA conversion occurs at baseband stage}</p> <p>1/0032 . . . {with analogue quadrature frequency conversion to and from the baseband (quadrature modulators and demodulators <i>per se</i> H03D 3/007, H03C 3/40)}</p> | <p>1/0035 . . . {Channel filtering, i.e. selecting a frequency channel within a software radio system (multiplexing of multicarrier modulation signals being represented by different frequencies H04L 5/06; multiplexing of multicarrier modulation signals H04L 5/023)}</p> <p>1/0039 . . . {using DSP [Digital Signal Processor] quadrature modulation and demodulation}</p> <p>1/0042 . . . {Digital filtering (H04B 1/0035 takes precedence; digital filters <i>per se</i> H03H 17/00)}</p> <p>1/0046 . . . {Decimation, i.e. data rate reduction techniques}</p> <p>1/005 . . . {adapting radio receivers, transmitters and transceivers for operation on two or more bands, i.e. frequency ranges}</p> <p>1/0053 . . . {with common antenna for more than one band}</p> <p>1/0057 . . . {using diplexing or multiplexing filters for selecting the desired band}</p> <p>1/006 . . . {using switches for selecting the desired band (H04B 1/0057 takes precedence)}</p> <p>1/0064 . . . {with separate antennas for the more than one band (H04B 1/0053 takes precedence)}</p> <p>1/0067 . . . {with one or more circuit blocks in common for different bands}</p> <p>1/0071 . . . {using a common intermediate frequency for more than one band (H04B 1/0075 takes precedence)}</p> <p>1/0075 . . . {using different intermediate frequencied for the different bands}</p> <p>1/0078 {with a common intermediate frequency amplifier for the different intermediate frequencies, e.g. when using switched intermediate frequency filters}</p> <p>1/0082 {with a common local oscillator for more than one band}</p> <p>1/0085 {where one band is the image frequency band of the other and the band selection is done by image rejection}</p> <p>1/0089 {using a first intermediate frequency higher than the highest of any band received}</p> <p>1/0092 {using a wideband front end}</p> <p>1/0096 . . . {where a full band is frequency converted into another full band}</p> |

- 1/02 . Transmitters
- 1/03 . . Constructional details, e.g. casings, housings
- 1/034 . . . Portable transmitters
- 1/0343 {to be carried on the body}
- 1/0346 {Hand-held transmitters}
- 1/036 . . . Cooling arrangements
- 1/04 . . Circuits
- 2001/0408 . . . {with power amplifiers}
- 2001/0416 {having gain or transmission power control}
- 2001/0425 {with linearisation using predistortion}
- 2001/0433 {with linearisation using feedback}
- 2001/0441 {with linearisation using feed-forward}
- 2001/045 {with means for improving efficiency}
- 1/0458 . . . {Arrangements for matching and coupling between power amplifier and antenna or between amplifying stages ([matching circuits in general H03H](#))}
- 1/0466 . . . {Fault detection or indication ([H04B 1/0483 takes precedence](#))}
- 1/0475 . . . {with means for limiting noise, interference or distortion ([H04B 1/0483 takes precedence](#))}
- 1/0483 . . . {Transmitters with multiple parallel paths}
- 2001/0491 . . . {with frequency synthesizers, frequency converters or modulators}
- 1/06 . Receivers
- 1/08 . . Constructional details, e.g. cabinet
- 1/082 . . . {to be used in vehicles ([H04B 1/086 takes precedence; holding or mounting accessories B60R 11/02](#))}
- 2001/084 {with removable front panel}
- 1/086 . . . {Portable receivers}
- 1/088 {with parts of the receiver detachable or collapsible}
- 1/10 . . Means associated with receiver for limiting or suppressing noise or interference
- 1/1009 . . . {Placing the antenna at a place where the noise level is low and using a noise-free transmission line between the antenna and the receivers ([screened aerials H01Q 7/04; feeders for aerials H01Q 9/00](#))}
- 1/1018 . . . {noise filters connected between the power supply and the receiver}
- 1/1027 . . . {assessing signal quality or detecting noise/interference for the received signal}
- 1/1036 {with automatic suppression of narrow band noise or interference, e.g. by using tuneable notch filters ([H04B 1/123 takes precedence; filter circuits H03H](#))}
- 2001/1045 {Adjacent-channel interference}
- 2001/1054 {by changing bandwidth}
- 2001/1063 {using a notch filter}
- 2001/1072 {by tuning the receiver frequency}
- 1/1081 . . . {Reduction of multipath noise ([by equalising H04B 7/005](#))}
- 1/109 . . . {by improving strong signal performance of the receiver when strong unwanted signals are present at the receiver input}
- 1/12 . . . Neutralising, balancing, or compensation arrangements
- 1/123 {using adaptive balancing or compensation means ([adaptive filter circuits and algorithms H03H](#))}
- 1/126 {having multiple inputs, e.g. auxiliary antenna for receiving interfering signal ([aerials in general H01Q](#))}
- 1/14 . . . Automatic detuning arrangements
- 1/16 . . Circuits
- 1/1607 . . . {Supply circuits ([converters H02M; filters therefor H02M 1/14; voltage stabilisers G05F 1/46](#))}
- 1/1615 {Switching on; Switching off, e.g. remotely (battery saving circuits associated with selective call operation [H04W 52/00](#); details of power consumption reduction in a PLL, [H03L 7/0802](#), [H03L 7/14](#), [H03L 2207/08](#), [H03L 2207/18](#); muting amplifiers by gain control [see H03G 3/34](#))}
- 1/1623 {using tubes}
- 1/163 . . . {Special arrangements for the reduction of the damping of resonant circuits of receivers ([amplifiers H03F; negative impedance networks for line transmission systems H04B 3/16](#))}
- 1/1638 . . . {Special circuits to enhance selectivity of receivers not otherwise provided for ([resonant circuits H03H](#))}
- 1/1646 . . . {adapted for the reception of stereophonic signals}
- 1/1653 {Detection of the presence of stereo signals and pilot signal regeneration}
- 1/1661 {Reduction of noise by manipulation of the baseband composite stereophonic signal or the decoded left and right channels}
- 1/1669 {of the demodulated composite stereo signal}
- 1/1676 {of the sum or difference signal}
- 1/1684 {of the decoded left or right stereo channel}
- 1/1692 {using companding of the stereo difference signal, e.g. FMX ([volume compression or expansion in amplifiers H03G 7/00](#))}
- 1/18 . . . Input circuits, e.g. for coupling to an antenna or a transmission line ([coupling networks between antennas or lines and receivers independent of the nature of the receiver H03H](#))
- 1/20 . . . for coupling gramophone pick-up, recorder output, or microphone to receiver
- 1/202 {by remote control}
- 1/205 {with control bus for exchanging commands between units}
- 1/207 {with an audio or audio/video bus for signal distribution ([H04B 1/205 takes precedence](#))}
- 1/22 . . . for receivers in which no local oscillation is generated
- 1/24 the receiver comprising at least one semiconductor device having three or more electrodes
- 1/26 . . . for superheterodyne receivers ([multiple frequency-changing H03D 7/16](#))
- 1/28 the receiver comprising at least one semiconductor device having three or more electrodes
- 1/30 . . . for homodyne or synchrodyne receivers ([demodulator circuits H03D 1/22](#))
- 1/302 {for single sideband receivers ([demodulator circuits H03D 1/24](#))}

2001/305	. . . . {using DC offset compensation techniques}	1/403	. . . using the same oscillator for generating both the transmitter frequency and the receiver local oscillator frequency
2001/307	. . . . {using n-port mixer}	1/405	. . . . with multiple discrete channels
1/38	. Transceivers, i.e. devices in which transmitter and receiver form a structural unit and in which at least one part is used for functions of transmitting and receiving	1/406	. . . . {with more than one transmission mode, e.g. analog and digital modes}
1/3805	. . with built-in auxiliary receivers	1/408	. . . . the transmitter oscillator frequency being identical to the receiver local oscillator frequency
2001/3811	. . . . {Split configuration of transmission devices}	1/44	. . . Transmit/receive switching
1/3816	. . Mechanical arrangements for accommodating identification devices, e.g. cards or chips; with connectors for programming identification devices	1/46	. . . . by voice-frequency signals; by pilot signals
1/3818	. . . Arrangements for facilitating insertion or removal of identification devices	1/48	. . . . in circuits for connecting transmitter and receiver to a common transmission path, e.g. by energy of transmitter { H04B 1/46 takes precedence }
1/3822	. . specially adapted for use in vehicles { H04B 1/3827 takes precedence }	2001/485	. . . . . {inhibiting unwanted transmission}
1/3827	. . Portable transceivers	1/50	. . . using different frequencies for the two directions of communication
1/3833	. . . {Hand-held transceivers}	1/52	. . . . Hybrid arrangements, i.e. arrangements for transition from single-path two-direction transmission to single-direction transmission on each of two paths or <i>vice versa</i>
1/3838	. . . . {Arrangements for reducing RF exposure to the user, e.g. by changing the shape of the transceiver while in use}	1/525	. . . . . with means for reducing leakage of transmitter signal into the receiver
2001/3844	. . . . . {with means to alert the user that a certain exposure has been reached}	1/54	. . . using the same frequency for two directions of communication (H04B 1/44 takes precedence)
1/385	. . . . {Transceivers carried on the body, e.g. in helmets}	1/56	. . . . . with provision for simultaneous communication in two directions
2001/3855	. . . . . {carried in a belt or harness}	1/58	. . . . . Hybrid arrangements, i.e. arrangements for transition from single-path two-direction transmission to single-direction transmission on each of two paths or <i>vice versa</i>
WARNING		1/581	. . . . . {using a transformer}
Group H04B 2001/3855 is impacted by reclassification into group A45F 5/1516 .		1/582	. . . . . {with automatic balancing}
Groups H04B 2001/3855 and A45F 5/1516 should be considered in order to perform a complete search.		1/583	. . . . . {using a bridge network}
2001/3861	. . . . . {carried in a hand or on fingers}	1/585	. . . . . {with automatic balancing}
WARNING		1/586	. . . . . {using an electronic circuit}
Group H04B 2001/3861 is impacted by reclassification into group A45F 5/1516 .		1/587	. . . . . {using opto-couplers (light transmission systems H04B 10/00)}
Groups H04B 2001/3861 and A45F 5/1516 should be considered in order to perform a complete search.		1/588	. . . . . {using sampling gates}
2001/3866	. . . . . {carried on the head}	1/59	. Responders; Transponders
2001/3872	. . . . . {with extendable microphones or earphones}	1/60	. Supervising unattended repeaters
1/3877	. . . Arrangements for enabling portable transceivers to be used in a fixed position, e.g. cradles or boosters	1/62	. for providing a predistortion of the signal in the transmitter and corresponding correction in the receiver, e.g. for improving the signal/noise ratio
1/3883	. . . Arrangements for mounting batteries or battery chargers	1/64	. . Volume compression or expansion arrangements
1/3888	. . . Arrangements for carrying or protecting transceivers	1/66	. for reducing bandwidth of signals; for improving efficiency of transmission (H04B 1/68 takes precedence)
WARNING		1/662	. . {using a time/frequency relationship, e.g. time compression or expansion}
Group H04B 1/3888 is impacted by reclassification into groups A45C 11/002 , A45C 11/003 , G06F 1/1629 and H04M 1/0203 .		1/665	. . {using psychoacoustic properties of the ear, e.g. masking effect}
All groups listed in this Warning should be considered in order to perform a complete search.		1/667	. . {using a division in frequency subbands (for TV signals H04N 19/63)}
2001/3894	. . . {Waterproofing of transmission device}	1/68	. for wholly or partially suppressing the carrier or one side band
1/40	. . Circuits	1/69	. Spread spectrum techniques
1/401	. . . for selecting or indicating operating mode	2001/6904	. . . {using code hopping}
		2001/6908	. . . {using time hopping}
		2001/6912	. . . {using chirp}
		2001/6916	. . . {Related theory}
		1/692	. . Hybrid techniques using combinations of two or more spread spectrum techniques

- 1/707 . . . using direct sequence modulation
- 2001/70706 . . . {using a code tracking loop, e.g. a delay locked loop}
- 1/70712 . . . {with demodulation by means of convolvers, e.g. of the SAW type (SAW convolvers in general [G06G 7/195](#))}
- 1/70718 . . . {with asynchronous demodulation, i.e. not requiring code synchronisation}
- 2001/70724 . . . {featuring pilot assisted reception}
- 1/7073 . . . Synchronisation aspects
- 1/70735 . . . {Code identification ([H04B 1/7083](#) takes precedence)}
- 1/7075 . . . with code phase acquisition
- 1/70751 . . . {using partial detection ([H04B 1/70758](#) takes precedence)}
- 1/70752 . . . {Partial correlation}
- 1/70753 . . . {Partial phase search}
- 1/70754 . . . {Setting of search window, i.e. range of code offsets to be searched ([H04B 1/70758](#) takes precedence)}
- 1/70755 . . . {Setting of lock conditions, e.g. threshold}
- 1/70756 . . . {Jumping within the code, i.e. masking or slewing ([H04B 1/70758](#) takes precedence)}
- 1/70757 . . . {with increased resolution, i.e. higher than half a chip ([H04B 1/70758](#) takes precedence)}
- 1/70758 . . . {Multimode search, i.e. using multiple search strategies}
- 1/7077 . . . Multi-step acquisition, e.g. multi-dwell, coarse-fine or validation
- 1/70775 . . . {Multi-dwell schemes, i.e. multiple accumulation times}
- 1/708 . . . Parallel implementation
- 1/7083 . . . Cell search, e.g. using a three-step approach
- 1/7085 . . . using a code tracking loop, e.g. a delay-locked loop
- 2001/70855 . . . {Dithering}
- 1/7087 . . . Carrier synchronisation aspects
- 1/709 . . . Correlator structure
- 1/7093 . . . Matched filter type
- 2001/70935 . . . {using a bank of matched filters, e.g. Fast Hadamard Transform}
- 1/7095 . . . Sliding correlator type
- 1/7097 . . . Interference-related aspects
- 1/71 . . . the interference being narrowband interference
- 1/7101 . . . {with estimation filters}
- 1/7102 . . . {with transform to frequency domain}
- 1/7103 . . . the interference being multiple access interference
- 1/7105 . . . Joint detection techniques, e.g. linear detectors
- 1/71052 . . . {using decorrelation matrix}
- 1/71055 . . . {using minimum mean squared error [MMSE] detector}
- 1/71057 . . . {using maximum-likelihood sequence estimation [MLSE]}
- 1/7107 . . . Subtractive interference cancellation
- 1/71072 . . . {Successive interference cancellation}
- 1/71075 . . . {Parallel interference cancellation}
- 2001/71077 . . . {Partial interference cancellation}
- 1/711 . . . the interference being multi-path interference
- 1/7113 . . . Determination of path profile
- 1/7115 . . . Constructive combining of multi-path signals, i.e. RAKE receivers
- 1/7117 . . . Selection, re-selection, allocation or re-allocation of paths to fingers, e.g. timing offset control of allocated fingers
- 1/712 . . . Weighting of fingers for combining, e.g. amplitude control or phase rotation using an inner loop
- 1/713 . . . using frequency hopping
- 1/7136 . . . Arrangements for generation of hop frequencies, e.g. using a bank of frequency sources, using continuous tuning or using a transform
- 2001/71362 . . . {using a bank of frequency sources}
- 2001/71365 . . . {using continuous tuning of a single frequency source}
- 2001/71367 . . . {using a transform}
- 1/7143 . . . Arrangements for generation of hop patterns
- 1/715 . . . Interference-related aspects
- 2001/7152 . . . {with means for suppressing interference}
- 2001/7154 . . . {with means for preventing interference}
- 1/7156 . . . Arrangements for sequence synchronisation
- 2001/71563 . . . {Acquisition}
- 2001/71566 . . . {Tracking}
- 1/7163 . . . using impulse radio
- 1/71632 . . . {Signal aspects ([H04B 1/7172](#) and [H04B 1/7176](#) take precedence)}
- 1/71635 . . . {Transmitter aspects ([H04B 1/7174](#) takes precedence)}
- 1/71637 . . . {Receiver aspects ([H04B 1/7183](#) takes precedence)}
- 1/717 . . . Pulse-related aspects
- 1/7172 . . . {Pulse shape (in general [H04L 25/03834](#))}
- 1/7174 . . . {Pulse generation (in general [H04L 25/03834](#))}
- 1/7176 . . . Data mapping, e.g. modulation
- 1/7183 . . . Synchronisation
- 1/719 . . . Interference-related aspects
- 1/72 . . . Circuits or components for simulating antennas, e.g. dummy antennas
- 1/74 . . . for increasing reliability, e.g. using redundant or spare channels or apparatus {(replacing by standby devices for amplifiers [H03F 1/52](#), [H03F 1/542](#))}
- 1/745 . . . {using by-passing or self-healing methods}
- 1/76 . . . Pilot transmitters or receivers for control of transmission or for equalising
- 3/00** **Line transmission systems (combined with near-field transmission systems [H04B 5/00](#))**
- 3/02 . . . Details
- 3/03 . . . Hybrid circuits (for transceivers [H04B 1/52](#), [H04B 1/58](#))
- 3/04 . . . Control of transmission; Equalising
- 3/06 . . . by the transmitted signal
- 3/08 . . . in negative-feedback path of line amplifier
- 3/10 . . . by pilot signal
- 3/11 . . . using pilot wire ([H04B 3/12](#) takes precedence)
- 3/12 . . . in negative-feedback path of line amplifier
- 3/14 . . . characterised by the equalising network used
- 3/141 . . . {using multiequalisers, e.g. bump, cosine, Bode}

- 3/142 {using echo-equalisers, e.g. transversal}
- 3/143 {using amplitude-frequency equalisers}
- 3/144 {fixed equalizers}
- 3/145 {variable equalisers}
- 3/146 {using phase-frequency equalisers}
- 3/147 {fixed equalisers}
- 3/148 {variable equalisers}
- 3/16 . . . characterised by the negative-impedance network used
- 3/18 wherein the network comprises semiconductor devices
- 3/20 . . Reducing echo effects or singing; Opening or closing transmitting path; Conditioning for transmission in one direction or the other
- 3/21 . . . using a set of bandfilters
- 3/23 . . . using a replica of transmitted signal in the time domain, e.g. echo cancellers
- 3/231 {Echo cancellers using readout of a memory to provide the echo replica}
- 3/232 {using phase shift, phase roll or frequency offset correction}
- 3/234 {using double talk detection}
- 3/235 {combined with adaptive equaliser}
- 3/237 {using two adaptive filters, e.g. for near end and for end echo cancelling}
- 3/238 {using initial training sequence}
- 3/26 . . Improving frequency characteristic by the use of loading coils
- 3/28 . . Reducing interference caused by currents induced in cable sheathing or armouring
- 3/30 . . Reducing interference caused by unbalanced currents in a normally balanced line
- 3/32 . . Reducing cross-talk, e.g. by compensating
- 3/34 . . . by systematic interconnection of lengths of cable during laying; by addition of balancing components to cable during laying
- 3/36 . . Repeater circuits ([H04B 3/58 takes precedence](#))
- 3/38 . . . for signals in two different frequency ranges transmitted in opposite directions over the same transmission path
- 3/40 . . Artificial lines; Networks simulating a line of certain length
- 3/42 . . Circuits for by-passing of ringing signals
- 3/44 . . Arrangements for feeding power to a repeater along the transmission line
- 3/46 . . Monitoring; Testing
- 3/462 . . . Testing group delay or phase shift, e.g. timing jitter
- 3/466 Testing attenuation in combination with at least one of group delay and phase shift
- 3/48 . . . Testing attenuation ([H04B 3/466 takes precedence](#))
- 3/487 . . . Testing crosstalk effects
- 3/493 . . . Testing echo effects or singing
- 3/50 . . Systems for transmission between fixed stations via two-conductor transmission lines ([H04B 3/54 takes precedence](#))
- 3/52 . . Systems for transmission between fixed stations via waveguides
- 3/54 . . Systems for transmission via power distribution lines
- 3/542 . . {the information being in digital form}
- 3/544 . . {Setting up communications; Call and signalling arrangements}
- 3/546 . . {Combination of signalling, telemetering, protection (circuits for remote indication of supply or distribution network condition [H02J 13/00](#))}
- 3/548 . . {the power on the line being DC (arrangements for feeding power [H04L 12/10](#); extracting feeding power from signals [H04L 25/02](#))}
- 3/56 . . Circuits for coupling, blocking, or by-passing of signals
- 3/58 . . Repeater circuits
- 3/60 . . Systems for communication between relatively movable stations, e.g. for communication with lift ([H04B 3/54 takes precedence](#))
- 5/00 Near-field transmission systems, e.g. inductive or capacitive transmission systems**
- 5/20 . . characterised by the transmission technique; characterised by the transmission medium
- 5/22 . . Capacitive coupling
- 5/24 . . Inductive coupling
- 5/26 . . . using coils
- 5/263 {Multiple coils at either side}
- 5/266 {One coil at each side, e.g. with primary and secondary coils}
- 5/28 . . using the near field of leaky cables, e.g. of leaky coaxial cables
- 5/40 . . characterised by components specially adapted for near-field transmission
- 5/43 . . Antennas
- 5/45 . . Transponders
- 5/48 . . Transceivers
- 5/70 . . specially adapted for specific purposes
- 5/72 . . for local intradevice communication
- 5/73 . . for taking measurements, e.g. using sensing coils
- 5/75 . . for isolation purposes
- 5/77 . . for interrogation
- 5/79 . . for data transfer in combination with power transfer
- 7/00 Radio transmission systems, i.e. using radiation field ([H04B 10/00](#), [H04B 15/00](#) take precedence)**
- 7/002 . . {Reducing depolarization effects}
- 7/005 . . Control of transmission; Equalising
- 7/01 . . Reducing phase shift
- 7/015 . . Reducing echo effects
- 7/02 . . Diversity systems; Multi-antenna system, i.e. transmission or reception using multiple antennas ([RAKE receivers H04B 1/7115](#))
- 7/022 . . Site diversity; Macro-diversity (using two or more spaced independent antennas [H04B 7/04](#))
- 7/024 . . . Co-operative use of antennas of several sites, e.g. in co-ordinated multipoint or co-operative multiple-input multiple-output [MIMO] systems
- 7/026 . . . Co-operative diversity, e.g. using fixed or mobile stations as relays
- 7/028 . . {Spatial transmit diversity using a single antenna at the transmitter}
- 7/04 . . using two or more spaced independent antennas
- 7/04013 . . . {Intelligent reflective surfaces}
- 7/04026 {with codebook-based beamforming}

7/0404	. . . the mobile station comprising multiple antennas, e.g. to provide uplink diversity	7/0626	. . . . . {Channel coefficients, e.g. channel state information [CSI]}
7/0408	. . . using two or more beams, i.e. beam diversity	7/0628	. . . . . {Diversity capabilities}
7/0413	. . . MIMO systems	7/063	. . . . . {Parameters other than those covered in groups H04B 7/0623 - H04B 7/0634 , e.g. channel matrix rank or transmit mode selection}
7/0417	. . . . Feedback systems		
7/0421	. . . . . {utilizing implicit feedback, e.g. steered pilot signals}		
7/0426	. . . . Power distribution		
7/043	. . . . . {using best eigenmode, e.g. beam forming or beam steering}	7/0632	. . . . . {Channel quality parameters, e.g. channel quality indicator [CQI]}
7/0434	. . . . . {using multiple eigenmodes}	7/0634	. . . . . {Antenna weights or vector/matrix coefficients}
7/0439	. . . . . {utilizing channel inversion}	7/0636	. . . . . {Feedback format}
7/0443	. . . . . {utilizing "waterfilling" technique}	7/0639	. . . . . {Using selective indices, e.g. of a codebook, e.g. pre-distortion matrix index [PMI] or for beam selection}
7/0447	. . . . . {utilizing uniform distribution}		
7/0452	. . . . Multi-user MIMO systems	7/0641	. . . . . {Differential feedback}
7/0456	. . . . Selection of precoding matrices or codebooks, e.g. using matrices antenna weighting	7/0643	. . . . . {Feedback on request}
7/046	. . . . . {taking physical layer constraints into account}	7/0645	. . . . . {Variable feedback}
7/0465	. . . . . {taking power constraints at power amplifier or emission constraints, e.g. constant modulus, into account}	7/0647	. . . . . {Variable feedback rate}
7/0469	. . . . . {taking special antenna structures, e.g. cross polarized antennas into account}	7/065	. . . . . {Variable contents, e.g. long-term or short-short}
7/0473	. . . . . {taking constraints in layer or codeword to antenna mapping into account}	7/0652	. . . . . {Feedback error handling}
7/0478	. . . . . {Special codebook structures directed to feedback optimisation}	7/0654	. . . . . {at the receiver, e.g. antenna verification at mobile station}
7/0479	. . . . . {for multi-dimensional arrays, e.g. horizontal or vertical pre-distortion matrix index [PMI]}	7/0656	. . . . . {at the transmitter, e.g. error detection at base station}
7/048	. . . . . {using three or more PMIs}	7/0658	. . . . . {Feedback reduction}
7/0481	. . . . . {using subset selection of codebooks}	7/066	. . . . . {Combined feedback for a number of channels, e.g. over several subcarriers like in orthogonal frequency division multiplexing [OFDM]}
7/0482	. . . . . {Adaptive codebooks}	7/0663	. . . . . {using vector or matrix manipulations}
7/0486	. . . . . {taking channel rank into account}	7/0665	. . . . . {Feed forward of transmit weights to the receiver}
7/0487	. . . . . {Codebooks having a nested structure}	7/0667	. . . . . {of delayed versions of same signal (using space-time coding H04L 1/0618)}
7/0491	. . . using two or more sectors, i.e. sector diversity	7/0669	. . . . . {using different channel coding between antennas (space-time coding H04L 1/0618)}
7/0495	. . . . using overlapping sectors in the same base station to implement MIMO for antennas	7/0671	. . . . . {using different delays between antennas}
7/06	. . . at the transmitting station	7/0673	. . . . . {using feedback from receiving side}
7/0602	. . . . {using antenna switching (H04B 7/0686 takes precedence; antenna beam directivity switching H01Q 3/24)}	7/0676	. . . . . {using random or pseudo-random delays}
7/0604	. . . . . {with predefined switching scheme}	7/0678	. . . . . {using different spreading codes between antennas (code allocation H04J 13/16)}
7/0606	. . . . . {Random or pseudo-random switching scheme}	7/068	. . . . . {using space frequency diversity (space-frequency coding H04L 1/0606)}
7/0608	. . . . . {Antenna selection according to transmission parameters}	7/0682	. . . . . {using phase diversity (e.g. phase sweeping)}
7/061	. . . . . {using feedback from receiving side}	7/0684	. . . . . {using different training sequences per antenna}
7/0613	. . . . . {using simultaneous transmission (H04B 7/0686 takes precedence)}	7/0686	. . . . . {Hybrid systems, i.e. switching and simultaneous transmission}
7/0615	. . . . . {of weighted versions of same signal}	7/0689	. . . . . {using different transmission schemes, at least one of them being a diversity transmission scheme}
7/0617	. . . . . {for beam forming}	7/0691	. . . . . {using subgroups of transmit antennas}
7/0619	. . . . . {using feedback from receiving side (feedback signaling for adaptive modulation/coding H04L 1/0001)}	7/0693	. . . . . {switching off a diversity branch, e.g. to save power}
7/0621	. . . . . {Feedback content}	7/0695	. . . . . {using beam selection}
7/0623	. . . . . {Auxiliary parameters, e.g. power control [PCB] or not acknowledged commands [NACK], used as feedback information}		

- 7/06952 {Selecting one or more beams from a plurality of beams, e.g. beam training, management or sweeping}
- 7/06954 {Sidelink beam training with support from third instance, e.g. the third instance being a base station}
- 7/06956 {using a selection of antenna panels}
- 7/06958 {Multistage beam selection, e.g. beam refinement}
- 7/0696 {Determining beam pairs}
- 7/06962 {Simultaneous selection of transmit [Tx] and receive [Rx] beams at both sides of a link}
- 7/06964 {Re-selection of one or more beams after beam failure}
- 7/06966 {using beam correspondence; using channel reciprocity, e.g. downlink beam training based on uplink sounding reference signal [SRS]}
- 7/06968 {using quasi-colocation [QCL] between signals}
- 7/0697 {using spatial multiplexing}
- 7/08 at the receiving station
- 7/0802 {using antenna selection ([H04B 7/0868](#) takes precedence; antenna beam directivity switching [H01Q 3/24](#))}
- 7/0805 {with single receiver and antenna switching ([H04B 7/0822](#) takes precedence)}
- 7/0808 {comparing all antennas before reception}
- 7/0811 {during preamble or gap period}
- 7/0814 {based on current reception conditions, e.g. switching to different antenna when signal level is below threshold}
- 7/0817 {with multiple receivers and antenna path selection}
- 7/082 {selecting best antenna path}
- 7/0822 {according to predefined selection scheme}
- 7/0825 {with main and with auxiliary or diversity antennas}
- 7/0828 {with delay elements in antenna paths}
- 7/0831 {Compensation of the diversity switching process for non-uniform properties or faulty operations of the switches used in the diversity switching process}
- 7/0834 {based on external parameters, e.g. subscriber speed or location}
- 7/0837 {using pre-detection combining ([H04B 7/0868](#) takes precedence)}
- 7/084 {Equal gain combining, only phase adjustments (antenna beam scanning or forming by phase or amplitude control [H01Q 3/26](#), e.g. phased arrays)}
- 7/0842 {Weighted combining}
- 7/0845 {per branch equalization, e.g. by an FIR-filter or RAKE receiver per antenna branch (rake receivers as such [H04B 1/7115](#))}
- 7/0848 {Joint weighting}
- 7/0851 {using training sequences or error signal (minimizing error signal [H04B 7/0854](#))}
- 7/0854 {using error minimizing algorithms, e.g. minimum mean squared error [MMSE], "cross-correlation" or matrix inversion}
- 7/0857 {using maximum ratio combining techniques, e.g. signal-to-interference ratio [SIR], received signal strength indication [RSS]}
- 7/086 {using weights depending on external parameters, e.g. direction of arrival [DOA], predetermined weights or beamforming}
- 7/0862 {receiver computing weights based on information from the transmitter}
- 7/0865 {Independent weighting, i.e. weights based on own antenna reception parameters}
- 7/0868 {Hybrid systems, i.e. switching and combining}
- 7/0871 {using different reception schemes, at least one of them being a diversity reception scheme}
- 7/0874 {using subgroups of receive antennas}
- 7/0877 {switching off a diversity branch, e.g. to save power}
- 7/088 {using beam selection}
- 7/0882 {using post-detection diversity}
- 7/0885 {with combination}
- 7/0888 {with selection}
- 7/0891 {Space-time diversity (rake receivers [H04B 1/7115](#); space-time decoding [H04L 1/0631](#))}
- 7/0894 {using different delays between antennas}
- 7/0897 {using beamforming per multi-path, e.g. to cope with different directions of arrival [DOA] at different multi-paths}
- 7/10 . . . Polarisation diversity; Directional diversity
- 7/12 . . . Frequency diversity
- 7/14 . . . Relay systems
- 7/145 . . . Passive relay systems
- 7/15 . . . Active relay systems
- 7/155 . . . Ground-based stations ([H04B 7/204](#) takes precedence)
- 7/15507 {Relay station based processing for cell extension or control of coverage area, (network planning with network coordinated processing with regard to cell extension [H04W 16/26](#); network topologies using dedicated repeater stations [H04W 84/047](#); terminal devices adapted for relaying to or from an other terminal [H04W 88/04](#))}
- 7/15514 {for shadowing compensation (for satellite mobile telephony service systems [H04B 7/18536](#))}
- 7/15521 {combining by calculations packets received from different stations before transmitting the combined packets as part of network coding (network coding aspects for detection or prevention of errors in the information received [H04L 1/0076](#); network traffic management with optimizing of information sizing, e.g. header compression, by using assembly and disassembly of packets [H04W 28/065](#))}

- 7/15528 {Control of operation parameters of a relay station to exploit the physical medium}
- 7/15535 {Control of relay amplifier gain (amplifier gain control in general [H03G 3/00](#); gain control reducing self - or loop interference [H04B 7/15578](#))}
- 7/15542 {Selecting at relay station its transmit and receive resources (selection of wireless resources by user or terminal [H04W 72/02](#); arrangements affording multiple use of the transmission path by two-dimensional division of the resources [H04L 5/0003](#), or by allocating sub-channels [H04L 5/003](#))}
- 7/1555 {Selecting relay station antenna mode, e.g. selecting omnidirectional -, directional beams, selecting polarizations}
- 7/15557 {Selecting relay station operation mode, e.g. between amplify and forward mode, decode and forward mode or FDD - and TDD mode}
- 7/15564 {Relay station antennae loop interference reduction}
- 7/15571 {by signal isolation, e.g. isolation by frequency or by antenna pattern, or by polarization}
- 7/15578 {by gain adjustment}
- 7/15585 {by interference cancellation}
- 7/15592 {Adapting at the relay station communication parameters for supporting cooperative relaying, i.e. transmission of the same data via direct - and relayed path (cooperative diversity [H04B 7/024](#))}
- 7/165 employing angle modulation
- 7/17 employing pulse modulation, e.g. pulse code modulation
- 7/185 Space-based or airborne stations; {Stations for satellite systems} ([H04B 7/204](#) takes precedence)
- 7/18502 {Airborne stations}
- 7/18504 {Aircraft used as relay or high altitude atmospheric platform}
- 7/18506 {Communications with or from aircraft, i.e. aeronautical mobile service}
- 7/18508 {with satellite system used as relay, i.e. aeronautical mobile satellite service}
- 7/1851 {Systems using a satellite or space-based relay ([H04B 7/18508](#), [H04B 7/18521](#) take precedence; providing specific services [H04B 7/18523](#) - [H04B 7/18576](#))}
- 7/18513 {Transmission in a satellite or space-based system}
- 7/18515 {Transmission equipment in satellites or space-based relays}
- 7/18517 {Transmission equipment in earth stations}
- 7/18519 {Operations control, administration or maintenance}
- 7/18521 {Systems of inter linked satellites, i.e. inter satellite service (for optical links between satellites [H04B 10/118](#))}
- 7/18523 {Satellite systems for providing broadcast service to terrestrial stations, i.e. broadcast satellite service (arrangements specially adapted for satellite broadcast receiving [H04H 40/90](#); picture transmission via satellite [H04N 1/00103](#); television transmission via satellite [H04N 7/20](#))}
- 7/18526 {Arrangements for data linking, networking or transporting, or for controlling an end to end session (data switching networks [H04L 12/00](#))}
- 7/18528 {Satellite systems for providing two-way communications service to a network of fixed stations, i.e. fixed satellite service or very small aperture terminal [VSAT] system}
- 7/1853 {Satellite systems for providing telephony service to a mobile station, i.e. mobile satellite service (for selecting [H04W](#))}
- 7/18532 {Arrangements for managing transmission, i.e. for transporting data or a signalling message}
- 7/18534 {for enhancing link reliability, e.g. satellites diversity}
- 7/18536 {Shadowing compensation therefor, e.g. by using an additional terrestrial relay}
- 7/18539 {Arrangements for managing radio, resources, i.e. for establishing or releasing a connection}
- 7/18541 {for handover of resources}
- 7/18543 {for adaptation of transmission parameters, e.g. power control (for detecting or preventing errors in the information received [H04L 1/00](#))}
- 7/18545 {Arrangements for managing station mobility, i.e. for station registration or localisation}
- 7/18547 {for geolocalisation of a station (position fixing by direction or distance determination [G01S 5/00](#))}
- 7/1855 {using a telephonic control signal, e.g. propagation delay variation, Doppler frequency variation, power variation, beam identification}
- 7/18552 {using a telephonic control signal and a second ranging satellite (determining absolute distances from a plurality of spaced points of known location [G01S 5/14](#))}
- 7/18554 {using the position provided by an existing geolocalisation system}
- 7/18556 {using a location database}
- 7/18558 {Arrangements for managing communications, i.e. for setting up, maintaining or releasing a call between stations}
- 7/1856 {for call routing}
- 7/18563 {Arrangements for interconnecting multiple systems (data switching networks [H04L 12/00](#))}
- 7/18565 {Arrangements for preventing unauthorised access or for providing user protection (arrangements for secret or secure communication [H04L 9/00](#))}

7/18567	{Arrangements for providing additional services to the basic mobile satellite telephony service}	7/2123	{Variable assignment, e.g. demand assignment}
7/18569	{Arrangements for system physical machines management, i.e. for construction operations control, administration, maintenance}	7/2125	{Synchronisation}
7/18571	{for satellites; for fixed or mobile stations}	7/2126	{using a reference station}
7/18573	{for operations control, administration or maintenance}	7/2128	{Changing of the reference station}
7/18576	{Satellite systems for providing narrowband data service to fixed or mobile stations, e.g. using a minisatellite, a microsatellite (for selecting H04W)}	7/216	Code division or spread-spectrum multiple access {[CDMA, SSMA]}
7/18578	{Satellite systems for providing broadband data service to individual earth stations (for selecting H04W ; provisions for broadband connection, H04Q 11/0478)}	7/22	Scatter propagation systems {, e.g. ionospheric, tropospheric or meteor scatter}
7/1858	{Arrangements for data transmission on the physical system, i.e. for data bit transmission between network components}	7/24	for communication between two or more posts (wireless communication networks H04W)
7/18582	{Arrangements for data linking, i.e. for data framing, for error recovery, for multiple access}	7/26	at least one of which is mobile
7/18584	{Arrangements for data networking, i.e. for data packet routing, for congestion control (data switching networks H04L 12/00)}	7/2603	{Arrangements for wireless physical layer control (H04B 7/2612 takes precedence)}
7/18586	{Arrangements for data transporting, e.g. for an end to end data transport or check}	7/2606	{Arrangements for base station coverage control, e.g. by using relays in tunnels}
7/18589	{Arrangements for controlling an end to end session, i.e. for initialising, synchronising or terminating an end to end link}	7/2609	{Arrangements for range control, e.g. by using remote antennas}
7/18591	{Arrangements for interconnecting multiple systems (data switching networks H04L 12/00)}	7/2612	{Arrangements for wireless medium access control, e.g. by allocating physical layer transmission capacity (H04B 7/2615 - H04B 7/2643 take precedence; provision for broadband connection H04Q 11/0478)}
7/18593	{Arrangements for preventing unauthorised access or for providing user protection (arrangements for secret or secure communication H04L 9/00)}	7/2615	{using hybrid frequency-time division multiple access [FDMA-TDMA]}
7/18595	{Arrangements for adapting broadband applications to satellite systems}	7/2618	{using hybrid code-time division multiple access [CDMA-TDMA]}
7/18597	{Arrangements for system physical machines management, i.e. for construction, operations control, administration, maintenance}	7/2621	{using frequency division multiple access [FDMA] (H04B 7/2615 takes precedence)}
7/19	Earth-synchronous stations	7/2625	{using common wave}
7/195	Non-synchronous stations	7/2628	{using code-division multiple access [CDMA] or spread spectrum multiple access [SSMA] (H04B 7/2618 takes precedence)}
7/204	Multiple access	7/2631	{for broadband transmission}
7/2041	{Spot beam multiple access}	7/2634	{for channel frequency control}
7/2043	{Mixed mode, TDM and FDM systems}	7/2637	{for logical channel control}
7/2045	{SS-FDMA, FDMA satellite switching}	7/264	{for data rate control}
7/2046	{SS-TDMA, TDMA satellite switching}	7/2643	{using time-division multiple access [TDMA] (H04B 7/2615 , H04B 7/2618 take precedence)}
7/2048	{Frame structure, synchronisation or frame acquisition in SS-TDMA systems}	7/2646	{for broadband transmission}
7/208	Frequency-division multiple access {[FDMA]}	7/265	{for channel frequency control}
7/212	Time-division multiple access {[TDMA]}	7/2653	{for logical channel control}
7/2121	{Channels assignment to the different stations}	7/2656	{for structure of frame, burst}
		7/2659	{for data rate control}
		7/2662	{Arrangements for Wireless System Synchronisation}
		7/2665	{Arrangements for Wireless Frequency Division Multiple Access [FDMA] System Synchronisation}
		7/2668	{Arrangements for Wireless Code-Division Multiple Access [CDMA] System Synchronisation, (for code acquisition H04B 1/7075 , for code tracking H04B 1/7085)}
		7/2671	{Arrangements for Wireless Time-Division Multiple Access [TDMA] System Synchronisation}
		7/2675	{Frequency synchronisation}
		7/2678	{Time synchronisation}
		7/2681	{Synchronisation of a mobile station with one base station}
		7/2684	{Synchronisation of a mobile station with more than one base station}

- 7/2687 {Inter base stations synchronisation}
- 7/269 {Leader-follower synchronisation}
- 7/2693 {Centralised synchronisation, i.e. using external universal time reference, e.g. by using a global positioning system [GPS] or by distributing time reference over the wireline network}
- 7/2696 {Over the air autonomous synchronisation, e.g. by monitoring network activity ([H04B 7/2693](#) takes precedence)}
- 10/00 Transmission systems employing electromagnetic waves other than radio-waves, e.g. infrared, visible or ultraviolet light, or employing corpuscular radiation, e.g. quantum communication**
- NOTE**
- In this group, non-optical transmission systems are classified in group [H04B 10/90](#).
- 10/03 . Arrangements for fault recovery
- 10/032 . . using working and protection systems {([H04J 14/0287](#) takes precedence)}
- 10/035 . . using loopbacks
- 10/038 . . using bypasses
- 10/07 . Arrangements for monitoring or testing transmission systems; Arrangements for fault measurement of transmission systems
- 10/071 . . using a reflected signal, e.g. using optical time domain reflectometers [OTDR]
- 10/073 . . using an out-of-service signal ([H04B 10/071](#) takes precedence)
- 10/0731 . . . {Testing or characterisation of optical devices, e.g. amplifiers}
- 10/075 . . using an in-service signal ([H04B 10/071](#) takes precedence)
- 10/077 . . . using a supervisory or additional signal
- 10/0771 {Fault location on the transmission path}
- 10/0773 {Network aspects, e.g. central monitoring of transmission parameters}
- 10/0775 {Performance monitoring and measurement of transmission parameters}
- 10/0777 {Monitoring line amplifier or line repeater equipment}
- 10/0779 {Monitoring line transmitter or line receiver equipment}
- 10/079 . . . using measurements of the data signal
- 10/0791 {Fault location on the transmission path}
- 10/0793 {Network aspects, e.g. central monitoring of transmission parameters}
- 10/0795 {Performance monitoring; Measurement of transmission parameters}
- 10/07951 {Monitoring or measuring chromatic dispersion or PMD}
- 10/07953 {Monitoring or measuring OSNR, BER or Q}
- 10/07955 {Monitoring or measuring power}
- 10/07957 {Monitoring or measuring wavelength}
- 10/0797 {Monitoring line amplifier or line repeater equipment}
- 10/0799 {Monitoring line transmitter or line receiver equipment}
- 10/11 . Arrangements specific to free-space transmission, i.e. transmission through air or vacuum
- 10/112 . . Line-of-sight transmission over an extended range
- 10/1121 . . . {One-way transmission}
- 10/1123 . . . {Bidirectional transmission}
- 10/1125 {using a single common optical path}
- 10/1127 {using two distinct parallel optical paths}
- 10/1129 . . . {Arrangements for outdoor wireless networking of information}
- 10/114 . . Indoor or close-range type systems
- 10/1141 . . . {One-way transmission}
- 10/1143 . . . {Bidirectional transmission}
- 10/1149 . . . {Arrangements for indoor wireless networking of information}
- 10/116 . . . Visible light communication
- 10/118 . . specially adapted for satellite communication
- 10/25 . Arrangements specific to fibre transmission
- 10/2507 . . for the reduction or elimination of distortion or dispersion
- 10/25073 . . . {using spectral equalisation, e.g. spectral filtering}
- 10/25077 . . . {using soliton propagation}
- 10/2513 . . . due to chromatic dispersion
- 10/25133 {including a lumped electrical or optical dispersion compensator ([H04B 10/2519](#), [H04B 10/2525](#) takes precedence)}
- 10/25137 {using pulse shaping at the transmitter, e.g. pre-chirping or dispersion supported transmission [DST]}
- 10/2519 using Bragg gratings
- 10/2525 using dispersion-compensating fibres
- 10/25253 {with dispersion management, i.e. using a combination of different kind of fibres in the transmission system}
- 10/2531 using spectral inversion
- 10/2537 . . . due to scattering processes, e.g. Raman or Brillouin scattering
- 10/2543 . . . due to fibre non-linearities, e.g. Kerr effect
- 10/255 Self-phase modulation [SPM]
- 10/2557 Cross-phase modulation [XPM]
- 10/2563 Four-wave mixing [FWM]
- 10/2569 . . . due to polarisation mode dispersion [PMD]
- 10/2572 . . . {due to forms of polarisation-dependent distortion other than PMD}
- 10/2575 . . Radio-over-fibre, e.g. radio frequency signal modulated onto an optical carrier
- 10/25751 . . . {Optical arrangements for CATV or video distribution ([adaptations of television systems for optical transmission H04N 7/22](#))}
- 10/25752 . . . {Optical arrangements for wireless networks}
- 10/25753 {Distribution optical network, e.g. between a base station and a plurality of remote units}
- 10/25754 {Star network topology}
- 10/25755 {Ring network topology}
- 10/25756 {Bus network topology}
- 10/25758 {between a central unit and a single remote unit by means of an optical fibre}
- 10/25759 {Details of the reception of RF signal or the optical conversion before the optical fibre}
- 10/2581 . . Multimode transmission
- 10/2587 . . using a single light source for multiple stations
- 10/2589 . . {Bidirectional transmission}

- 10/25891 . . . {Transmission components ([H04B 10/40](#) takes precedence)}
- 10/27 . Arrangements for networking
- 10/271 . . {Combination of different networks, e.g. star and ring configuration in the same network or two ring networks interconnected}
- 10/272 . . Star-type networks {or tree-type networks}
- 10/2725 . . . {Star-type networks without a headend}
- 10/275 . . Ring-type networks
- 10/2755 . . . {Ring-type networks with a headend}
- 10/278 . . Bus-type networks
- 10/29 . Repeaters
- 10/291 . . in which processing or amplification is carried out without conversion of the main signal from optical form
- 10/2912 . . . {characterised by the medium used for amplification or processing}
- 10/2914 {using lumped semiconductor optical amplifiers [SOA]}
- 10/2916 {using Raman or Brillouin amplifiers}
- 10/293 . . . Signal power control
- 10/2931 {using AGC ([H04B 10/294](#) takes precedence)}
- 10/2933 {considering the whole optical path}
- 10/2935 {with a cascade of amplifiers}
- 10/2937 {Systems with a repeater placed only at the beginning or the end of the system, i.e. repeaterless systems, e.g. systems with only post and pre-amplification}
- 10/2939 {Network aspects}
- 10/294 in a multiwavelength system, e.g. gain equalisation
- 10/2941 {using an equalising unit, e.g. a filter ([H04B 10/296](#) takes precedence)}
- 10/2942 {using automatic gain control [AGC] ([H04B 10/296](#) takes precedence)}
- 10/296 Transient power control, e.g. due to channel add/drop or rapid fluctuations in the input power
- 10/297 . . . Bidirectional amplification
- 10/2971 {A single amplifier for both directions}
- 10/2972 {Each direction being amplified separately}
- 10/298 . . . {Two-way repeaters, i.e. repeaters amplifying separate upward and downward lines}
- 10/299 . . . Signal waveform processing, e.g. reshaping or retiming
- 10/40 . Transceivers
- 10/43 . . using a single component as both light source and receiver, e.g. using a photoemitter as a photoreceiver
- 10/50 . Transmitters
- 10/501 . . {Structural aspects}
- 10/502 . . . {LED transmitters}
- 10/503 . . . {Laser transmitters}
- 10/504 {using direct modulation}
- 10/505 {using external modulation}
- 10/5051 {using a series, i.e. cascade, combination of modulators}
- 10/5053 {using a parallel, i.e. shunt, combination of modulators}
- 10/5055 {using a pre-coder}
- 10/5057 {using a feedback signal generated by analysing the optical output}
- 10/50572 {to control the modulating signal amplitude including amplitude distortion}
- 10/50575 {to control the modulator DC bias}
- 10/50577 {to control the phase of the modulating signal}
- 10/5059 {using a feed-forward signal generated by analysing the optical or electrical input}
- 10/50593 {to control the modulating signal amplitude including amplitude distortion}
- 10/50595 {to control the modulator DC bias}
- 10/50597 {to control the phase of the modulating signal}
- 10/506 . . . {Multiwavelength transmitters}
- 10/508 . . Pulse generation, e.g. generation of solitons
- 10/516 . . Details of coding or modulation
- 10/5161 . . . {Combination of different modulation schemes}
- 10/5162 . . . {Return-to-zero modulation schemes}
- 10/5165 . . . {Carrier suppressed; Single sideband; Double sideband or vestigial}
- 10/5167 . . . {Duo-binary; Alternative mark inversion; Phase shaped binary transmission}
- 10/524 . . . Pulse modulation
- 10/532 . . . Polarisation modulation
- 10/54 . . . Intensity modulation
- 10/541 {Digital intensity or amplitude modulation}
- 10/548 . . . Phase or frequency modulation
- 10/556 Digital modulation, e.g. differential phase shift keying [DPSK] or frequency shift keying [FSK]
- 10/5561 {Digital phase modulation}
- 10/5563 {Digital frequency modulation}
- 10/564 . . Power control
- 10/572 . . Wavelength control
- 10/58 . . Compensation for non-linear transmitter output
- 10/588 . . . in external modulation systems
- 10/60 . Receivers
- 10/61 . . Coherent receivers
- 10/612 . . . {for optical signals modulated with a format different from binary or higher-order PSK [X-PSK], e.g. QAM, DPSK, FSK, MSK, ASK}
- 10/613 . . . {including phase diversity, e.g., having in-phase and quadrature branches, as in QPSK coherent receivers}
- 10/614 . . . {comprising one or more polarization beam splitters, e.g. polarization multiplexed [PolMux] X-PSK coherent receivers, polarization diversity heterodyne coherent receivers ([H04J 14/06](#) takes precedence)}
- 10/615 . . . {Arrangements affecting the optical part of the receiver}
- 10/6151 {comprising a polarization controller at the receiver's input stage}
- 10/616 . . . {Details of the electronic signal processing in coherent optical receivers}
- 10/6161 {Compensation of chromatic dispersion}
- 10/6162 {Compensation of polarization related effects, e.g., PMD, PDL}
- 10/6163 {Compensation of non-linear effects in the fiber optic link, e.g. self-phase modulation [SPM], cross-phase modulation [XPM], four wave mixing [FWM]}

- 10/6164 {Estimation or correction of the frequency offset between the received optical signal and the optical local oscillator}
- 10/6165 {Estimation of the phase of the received optical signal, phase error estimation or phase error correction}
- 10/6166 {Polarisation demultiplexing, tracking or alignment of orthogonal polarisation components}
- 10/63 . . . Homodyne {, i.e. coherent receivers where the local oscillator is locked in frequency and phase to the carrier signal}
- 10/64 . . . Heterodyne {, i.e. coherent receivers where, after the opto-electronic conversion, an electrical signal at an intermediate frequency [IF] is obtained}
- 10/65 . . . {Intradyn, i.e. coherent receivers with a free running local oscillator having a frequency close but not phase-locked to the carrier signal}
- 10/66 . . Non-coherent receivers, e.g. using direct detection
- 10/67 . . . Optical arrangements in the receiver
- 10/671 {for controlling the input optical signal}
- 10/672 {for controlling the power of the input optical signal}
- 10/673 {using an optical preamplifier}
- 10/674 {using a variable optical attenuator}
- 10/675 {for controlling the optical bandwidth of the input signal, e.g. spectral filtering}
- 10/676 {for all-optical demodulation of the input optical signal}
- 10/677 {for differentially modulated signal, e.g. DPSK signals}
- 10/69 . . . Electrical arrangements in the receiver
- 10/691 {Arrangements for optimizing the photodetector in the receiver}
- 10/6911 {Photodiode bias control, e.g. for compensating temperature variations}
- 10/693 {Arrangements for optimizing the preamplifier in the receiver}
- 10/6931 {Automatic gain control of the preamplifier}
- 10/6932 {Bandwidth control of bit rate adaptation}
- 10/6933 {Offset control of the differential preamplifier}
- 10/695 {Arrangements for optimizing the decision element in the receiver, e.g. by using automatic threshold control}
- 10/697 {Arrangements for reducing noise and distortion}
- 10/6971 {using equalisation}
- 10/6972 {using passive filtering}
- 10/6973 {using noise matching networks}
- 10/70 . Photonic quantum communication
- 10/80 . Optical aspects relating to the use of optical transmission for specific applications, not provided for in groups [H04B 10/03](#) - [H04B 10/70](#), e.g. optical power feeding or optical transmission through water
- 10/801 . . {using optical interconnects, e.g. light coupled isolators, circuit board interconnections}
- 10/802 . . . {for isolation, e.g. using optocouplers}
- 10/803 . . . {Free space interconnects, e.g. between circuit boards or chips}
- 10/806 . . {Arrangements for feeding power}
- 10/807 . . . {Optical power feeding, i.e. transmitting power using an optical signal}
- 10/808 . . . {Electrical power feeding of an optical transmission system}
- 10/85 . . Protection from unauthorised access, e.g. eavesdrop protection
- 10/90 . Non-optical transmission systems, e.g. transmission systems employing non-photonic corpuscular radiation
- 11/00** **Transmission systems employing ultrasonic, sonic or infrasonic waves**
- 13/00** **Transmission systems characterised by the medium used for transmission, not provided for in groups [H04B 3/00](#) - [H04B 11/00](#)**
- 13/005 . {Transmission systems in which the medium consists of the human body}
- 13/02 . Transmission systems in which the medium consists of the earth or a large mass of water thereon, e.g. earth telegraphy
- 14/00** **Transmission systems not characterised by the medium used for transmission (details thereof [H04B 1/00](#))**
- 14/002 . {characterised by the use of a carrier modulation (using subcarrier modulation [H04B 14/08](#))}
- 14/004 . . {Amplitude modulation}
- 14/006 . . {Angle modulation}
- 14/008 . . {Polarisation modulation}
- 14/02 . characterised by the use of pulse modulation (in radio transmission relays [H04B 7/17](#))
- 14/023 . . {using pulse amplitude modulation}
- 14/026 . . {using pulse time characteristics modulation, e.g. width, position, interval}
- 14/04 . . using pulse code modulation
- 14/042 . . . {Special circuits, e.g. comparators}
- 14/044 . . . {Sample and hold circuits (in general [G11C 27/02](#))}
- 14/046 . . . {Systems or methods for reducing noise or bandwidth}
- 14/048 {Non linear compression or expansion}
- 14/06 . . using differential modulation, e.g. delta modulation
- 14/062 . . . {using delta modulation or one-bit differential modulation [1DPCM]}
- 14/064 {with adaptive feedback}
- 14/066 . . . {using differential modulation with several bits [NDPCM]}
- 14/068 {with adaptive feedback}
- 14/08 . characterised by the use of a sub-carrier
- 15/00** **Suppression or limitation of noise or interference (by means associated with receiver [H04B 1/10](#))**
- 15/005 . {Reducing noise, e.g. humm, from the supply}
- 15/02 . Reducing interference from electric apparatus by means located at or near the interfering apparatus
- 15/025 . . {Reducing interference from ignition apparatus of fuel engines (cables with high resistance [H01B](#))}
- 15/04 . . the interference being caused by substantially sinusoidal oscillations, e.g. in a receiver or in a tape-recorder
- 15/06 . . . by local oscillators of receivers

- 17/00 **Monitoring; Testing** (of line transmission systems [H04B 3/46](#); arrangements for monitoring or testing transmission systems employing electromagnetic waves other than radio waves [H04B 10/07](#))
 - 17/0082 . {using service channels; using auxiliary channels}
 - 17/0085 . . {using test signal generators}
 - 17/0087 . . {using auxiliary channels or channel simulators}
 - 17/10 . of transmitters
 - 17/101 . . {for measurement of specific parameters of the transmitter or components thereof}
 - 17/102 . . . {Power radiated at antenna}
 - 17/103 . . . {Reflected power, e.g. return loss}
 - 17/104 . . . {of other parameters, e.g. DC offset, delay or propagation times}
 - 17/11 . . for calibration
 - 17/12 . . . of transmit antennas, e.g. of the amplitude or phase
 - 17/13 . . . of power amplifiers, e.g. gain or non-linearity
 - 17/14 . . . of the whole transmission and reception path, e.g. self-test loop-back
 - 17/15 . . Performance testing
 - WARNING**
 - Group [H04B 17/15](#) is impacted by reclassification into group [H04B 17/191](#).
 - Groups [H04B 17/15](#) and [H04B 17/191](#) should be considered in order to perform a complete search.
 - 17/16 . . . Test equipment located at the transmitter
 - 17/17 . . . Detection of non-compliance or faulty performance, e.g. response deviations ([H04B 17/18](#) takes precedence)
 - 17/18 . . . Monitoring during normal operation
 - 17/19 . . . Self-testing arrangements
 - 17/191 . . . {Over-the-air testing}
 - WARNING**
 - Group [H04B 17/191](#) is incomplete pending reclassification of documents from group [H04B 17/15](#).
 - Groups [H04B 17/15](#) and [H04B 17/191](#) should be considered in order to perform a complete search.
 - 17/20 . of receivers
 - WARNING**
 - Group [H04B 17/20](#) is impacted by reclassification into groups [H04B 17/201](#), [H04B 17/202](#), [H04B 17/203](#), [H04B 17/204](#), [H04B 17/22](#), [H04B 17/221](#), [H04B 17/25](#), [H04B 17/252](#), [H04B 17/253](#), [H04B 17/254](#) and [H04B 17/255](#).
 - All groups listed in this Warning should be considered in order to perform a complete search.
- 17/201 . . {for measurement of specific parameters of the receiver or components thereof}
 - WARNING**
 - Groups [H04B 17/201](#), [H04B 17/202](#), [H04B 17/203](#) and [H04B 17/204](#) are incomplete pending reclassification of documents from group [H04B 17/20](#).
 - All groups listed in this Warning should be considered in order to perform a complete search.
- 17/202 . . . {Power received at the antenna}
- 17/203 . . . {Receiver sensitivity}
- 17/204 . . . {of interfering signals, e.g. passive intermodulation}
- 17/21 . . for calibration; for correcting measurements
 - WARNING**
 - Group [H04B 17/21](#) is impacted by reclassification into groups [H04B 17/22](#) and [H04B 17/221](#).
 - Groups [H04B 17/21](#), [H04B 17/22](#) and [H04B 17/221](#) should be considered in order to perform a complete search.
- 17/22 . . . {for calibration of the receiver components}
 - WARNING**
 - Groups [H04B 17/22](#) and [H04B 17/221](#) are incomplete pending reclassification of documents from groups [H04B 17/20](#) and [H04B 17/21](#).
 - All groups listed in this Warning should be considered in order to perform a complete search.
- 17/221 {of receiver antennas, e.g. as to amplitude or phase}
- 17/23 . . Indication means, e.g. displays, alarms, audible means
- 17/24 . . with feedback of measurements to the transmitter
- 17/25 . . {taking multiple measurements}
 - WARNING**
 - Groups [H04B 17/25](#), [H04B 17/252](#), [H04B 17/253](#), [H04B 17/254](#) and [H04B 17/255](#) are incomplete pending reclassification of documents from group [H04B 17/20](#).
 - All groups listed in this Warning should be considered in order to perform a complete search.
- 17/252 . . . {measuring signals from different transmission points or directions of arrival, e.g. in multi RAT or dual connectivity}
- 17/253 . . . {measuring at different locations or reception points}
- 17/254 . . . {measuring at different reception times}
- 17/255 . . . {measuring at different states of transmission, e.g. active or idle; measuring at different measurement rates; measuring with different measurement schedules}
- 17/26 . . using historical data, averaging values or statistics
- 17/27 . . for locating or positioning the transmitter

- 17/29 . . Performance testing
 - WARNING**
 - Group [H04B 17/29](#) is impacted by reclassification into groups [H04B 17/294](#), [H04B 17/295](#), [H04B 17/296](#) and [H04B 17/297](#).
 - All groups listed in this Warning should be considered in order to perform a complete search.
- 17/294 . . . {with test equipment located at the receiver}
 - WARNING**
 - Group [H04B 17/294](#) is incomplete pending reclassification of documents from group [H04B 17/29](#).
 - Groups [H04B 17/29](#) and [H04B 17/294](#) should be considered in order to perform a complete search.
- 17/295 . . . {Detection of non-compliance or faulty performance, e.g. response deviations (monitoring during normal operations [H04B 17/296](#))}
 - WARNING**
 - Group [H04B 17/295](#) is incomplete pending reclassification of documents from group [H04B 17/29](#).
 - Groups [H04B 17/29](#) and [H04B 17/295](#) should be considered in order to perform a complete search.
- 17/296 . . . {Monitoring performance during normal operation}
 - WARNING**
 - Group [H04B 17/296](#) is incomplete pending reclassification of documents from group [H04B 17/29](#).
 - Groups [H04B 17/29](#) and [H04B 17/296](#) should be considered in order to perform a complete search.
- 17/297 . . . {Self-testing arrangements}
 - WARNING**
 - Group [H04B 17/297](#) is incomplete pending reclassification of documents from group [H04B 17/29](#).
 - Groups [H04B 17/29](#) and [H04B 17/297](#) should be considered in order to perform a complete search.
- 17/30 . of propagation channels
- 17/309 . . Measuring or estimating channel quality parameters
 - WARNING**
 - Group [H04B 17/309](#) is impacted by reclassification into groups [H04B 17/346](#) and [H04B 17/347](#).
 - Groups [H04B 17/309](#), [H04B 17/346](#) and [H04B 17/347](#) should be considered in order to perform a complete search.
- 17/318 . . . Received signal strength
 - WARNING**
 - Group [H04B 17/318](#) is impacted by reclassification into group [H04B 17/328](#).
 - Groups [H04B 17/318](#) and [H04B 17/328](#) should be considered in order to perform a complete search.
- 17/327 Received signal code power [RSCP]
- 17/328 {Reference signal received power [RSRP]; Reference signal received quality [RSRQ]}
 - WARNING**
 - Group [H04B 17/328](#) is incomplete pending reclassification of documents from group [H04B 17/318](#).
 - Groups [H04B 17/318](#) and [H04B 17/328](#) should be considered in order to perform a complete search.
- 17/336 . . . Signal-to-interference ratio [SIR] or carrier-to-interference ratio [CIR]
- 17/345 . . . Interference values ({signal-to-interference ratio [SIR] or carrier-to-interference ratio [CIR]} [H04B 17/336](#))
- 17/346 . . . {Noise values (signal-to-interference ratio [SIR] or carrier-to-interference ratio [CIR]} [H04B 17/336](#))}
 - WARNING**
 - Group [H04B 17/346](#) is incomplete pending reclassification of documents from group [H04B 17/309](#).
 - Groups [H04B 17/309](#) and [H04B 17/346](#) should be considered in order to perform a complete search.
- 17/347 . . . {Path loss}
 - WARNING**
 - Group [H04B 17/347](#) is incomplete pending reclassification of documents from group [H04B 17/309](#).
 - Groups [H04B 17/309](#) and [H04B 17/347](#) should be considered in order to perform a complete search.
- 17/354 . . . Adjacent channel leakage power
- 17/364 . . . Delay profiles
- 17/373 . . Predicting channel quality {or other radio frequency [RF]} parameters
- 17/382 . . for resource allocation, admission control or handover
- 17/391 . . Modelling the propagation channel
- 17/3911 . . . {Fading models or fading generators}
- 17/3912 . . . {Simulation models, e.g. distribution of spectral power density or received signal strength indicator [RSSI] for a given geographic region}
- 17/3913 . . . {Predictive models, e.g. based on neural network models}
- 17/40 . of relay systems
- 17/401 . . {with selective localization}
- 17/402 . . . {using different frequencies}
- 17/403 {generated by local oscillators}

- 17/404 {selected by local filters}
 - 17/405 {generated by local multipliers, dividers, modulators}
 - 17/406 {using coded addresses}
 - 17/407 . . {without selective localization}
 - 17/408 {using successive loop-backs}
 - 17/409 {by means of resistance, voltage or current measurement}
- 2201/00 Indexing scheme relating to details of transmission systems not covered by a single group of [H04B 3/00](#) - [H04B 13/00](#)**
- 2201/69 . . Orthogonal indexing scheme relating to spread spectrum techniques in general
 - 2201/692 . . Cognitive radio
 - 2201/694 . . WPAN
 - 2201/696 . . relating to Downlink
 - 2201/698 . . relating to Uplink
 - 2201/707 . . relating to direct sequence modulation
 - 2201/70701 . . . featuring pilot assisted reception
 - 2201/70702 . . . Intercell-related aspects
 - 2201/70703 . . . using multiple or variable rates
 - 2201/70705 Rate detection
 - 2201/70706 . . . with means for reducing the peak-to-average power ratio
 - 2201/70707 . . . Efficiency-related aspects
 - 2201/70709 with discontinuous detection
 - 2201/7071 with dynamic control of receiver resources
 - 2201/70711 with modular structure
 - 2201/70713 Reducing computational requirements
 - 2201/70714 Reducing hardware requirements
 - 2201/70715 . . . with application-specific features
 - 2201/70716 . . . Quadrature
 - 2201/70718 . . . Particular systems or standards
 - 2201/70719 CDMA2000
 - 2201/7072 HDR
 - 2201/70722 HSDPA/HSUPA
 - 2201/70723 Multi-carrier HSPA
 - 2201/70724 UMTS
 - 2201/70726 Asynchronous CDMA
 - 2201/70727 . . . using fast Fourier transform
 - 2201/70728 . . . Frequency aspects
 - 2201/7073 . . . Direct sequence modulation synchronisation
 - 2201/70733 2D search
 - 2201/70736 DSA
 - 2201/7097 . . . Direct sequence modulation interference
 - 2201/709709 Methods of preventing interference
 - 2201/709718 Determine interference
 - 2201/709727 GRAKE type RAKE receivers
 - 2201/709736 Hybrid interference mitigation schemes
 - 2201/709745 Iterative interference mitigation schemes
 - 2201/709754 Blind joint detection
 - 2201/709763 Joint detection using feedback
 - 2201/709772 Joint detection using feedforward
 - 2201/709781 Linear detectors for joint detection
 - 2201/70979 Fat finger issues in RAKE receivers
 - 2201/713 . . . Frequency hopping
 - 2201/71307 . . . Partial band interference
 - 2201/71315 . . . Wide band interference
 - 2201/71323 . . . Adaptive systems
 - 2201/7133 . . . Asymmetric systems
 - 2201/71338 . . . Asynchronous systems
 - 2201/71346 . . . Bluetooth®
 - 2201/71353 . . . Fast frequency hopping
 - 2201/71361 . . . Slow frequency hopping
 - 2201/71369 . . . OFCHM
 - 2201/71376 . . . Threshold
 - 2201/71384 . . . Look-up tables
 - 2201/7163 . . Orthogonal indexing scheme relating to impulse radio
 - 2201/71632 . . . Diversity
 - 2201/71634 . . . Applied to ranging
 - 2201/71636 . . . Transmitted reference
 - 2201/71638 . . . Spectrum issues
- 2203/00 Indexing scheme relating to line transmission systems**
- 2203/54 . . Aspects of powerline communications not already covered by [H04B 3/54](#) and its subgroups
 - 2203/5404 . . Methods of transmitting or receiving signals via power distribution lines
 - 2203/5408 . . . using protocols
 - 2203/5412 . . . by modifying wave form of the power source
 - 2203/5416 . . . by adding signals to the wave form of the power source
 - 2203/542 . . . using zero crossing information
 - 2203/5425 . . . improving S/N by matching impedance, noise reduction, gain control
 - 2203/5429 . . Applications for powerline communications
 - 2203/5433 . . . Remote metering
 - 2203/5437 . . . Wired telephone
 - 2203/5441 . . . Wireless systems or telephone
 - 2203/5445 . . . Local network
 - 2203/545 . . . Audio/video application, e.g. interphone
 - 2203/5454 . . . Adapter and plugs
 - 2203/5458 . . . Monitor sensor; Alarm systems
 - 2203/5462 . . Systems for power line communications
 - 2203/5466 . . . using three phases conductors
 - 2203/547 . . . via DC power distribution
 - 2203/5475 . . . adapted for drill or well combined with data transmission
 - 2203/5479 . . . using repeaters
 - 2203/5483 . . . using coupling circuits
 - 2203/5487 cables
 - 2203/5491 . . . using filtering and bypassing
 - 2203/5495 . . . having measurements and testing channel
- 2210/00 Indexing scheme relating to optical transmission systems**
- 2210/003 . . Devices including multiple stages, e.g., multi-stage optical amplifiers or dispersion compensators
 - 2210/006 . . Devices for generating or processing an RF signal by optical means
 - 2210/07 . . Monitoring an optical transmission system using a supervisory signal
 - 2210/071 . . . using alarms
 - 2210/072 . . . using an overhead signal
 - 2210/074 . . . using a superposed, over-modulated signal
 - 2210/075 . . . using a pilot tone
 - 2210/077 . . . using a separate fibre
 - 2210/078 . . . using a separate wavelength
 - 2210/08 . . Shut-down or eye-safety
 - 2210/25 . . Distortion or dispersion compensation
 - 2210/252 . . . after the transmission line, i.e. post-compensation

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- 2210/254 . . before the transmission line, i.e. pre-compensation
- 2210/256 . . at the repeater, i.e. repeater compensation
- 2210/258 . . treating each wavelength or wavelength band separately
- 2210/516 . Optical conversion of optical modulation formats, e.g., from optical ASK to optical PSK
- 2210/517 . Optical NRZ to RZ conversion, or vice versa

- 2215/00 Reducing interference at the transmission system level**
- 2215/061 . Reduction of burst noise, e.g. in TDMA systems
- 2215/062 . . by inhibiting burst transmission
- 2215/063 . . by smoothing the transmission power envelope
- 2215/064 . Reduction of clock or synthesizer reference frequency harmonics
- 2215/065 . . by changing the frequency of clock or reference frequency
- 2215/066 . . by stopping a clock generator
- 2215/067 . . by modulation dispersion
- 2215/068 . . by avoiding a reception frequency range
- 2215/069 . Reduction of switch mode power supply ripple