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

The following IPC groups are not used in the CPC scheme. Subject matter covered by these groups is classified in the following CPC groups:

- H04B 10/04 covered by H04B 10/50 H04B 10/06 covered by H04B 10/60 H04B 10/08 covered by H04B 10/07 H04B 10/10 covered by H04B 10/11 H04B 10/13 covered by H04B 10/2581 H04B 10/26 covered by H04B 10/24B H04B 10/43

Guidance heading:

H04B 1/00 Details of transmission systems, not covered by a single one of groups H04B 3/00 to H04B 13/00; Details of transmission systems not characterised by the medium used for transmission (tuning resonant circuits H03J)

NOTE

In this group, group H04B 1/0003 takes precedence over groups H04B 1/005 to H04B 1/76

H04B 1/0003 Software-defined radio (SDR) systems, i.e. systems wherein components typically implemented in hardware, e.g. filters or modulators/demodulators, are implemented 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)

WARNING

Groups H04B 1/0003 and subgroups are not complete pending a reorganisation. See also group H04B 1/406

H04B 1/0007 Wherein the AD/DA conversion occurs at radiofrequency or intermediate frequency stage
{ 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 ) }

{ using DSP [Digital Signal Processor] quadrature modulation and demodulation }

{ Digital filtering ( H04B 1/001 takes precedence; digital filters per se H03H 17/00 ) }

{ Decimation, i.e. data rate reduction techniques ( H04B 1/0025 takes precedence ) }

{ using a sampling rate lower than twice the highest frequency component of the sampled signal ( for demodulation of angle-modulated signals H03D 3/006 ) }

{ wherein the AD/DA conversion occurs at baseband stage }

{ with analogue quadrature frequency conversion to and from the baseband (quadrature modulators and demodulators per se H03D 3/007 , H03C 3/40 ) }

{ 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 ) }

{ using DSP [Digital Signal Processor] quadrature modulation and demodulation }

{ Digital filtering ( H04B 1/0035 takes precedence; digital filters per se H03H 17/00 ) }

{ Decimation, i.e. data rate reduction techniques }

{ adapting radio receivers, transmitters and transceivers for operation on two or more bands, i.e. frequency ranges }

{ with common antenna for more than one band }

{ using diplexing or multiplexing filters for selecting the desired band }

{ using switches for selecting the desired band ( H04B 1/0057 takes preference ) }

{ with separate antennas for the more than one band ( H04B 1/0053 takes precedence ) }

{ with one or more circuit blocks in common for different bands }

{ using a common intermediate frequency for more than one band ( H04B 1/0075 takes precedence ) }

{ using different intermediate frequencies for the different bands }

{ with a common intermediate frequency amplifier for the different intermediate frequencies, e.g. when using switched intermediate frequency filters }

{ with a common local oscillator for more than one band }

{ where one band is the image frequency band of the other and the band selection is done by image rejection }

{ using a first intermediate frequency higher that the highest of any band received }

{ using a wideband front end }

{ where a full band is frequency converted into another full band }

{ Transmitters ( spatial arrangements of component circuits in radio pills for living beings A61B 5/07 ) }
Constructional details, e.g. casings, housings (adapted for airplanes B64D)

Portable transmitters (distress beacons G01S 1/68; means for indicating the location of accidentally buried persons A63B 29/021)

{ to be carried on the body }

Hand-held transmitters

Cooling arrangements (cooling transformers H01F 27/08; cooling discharge tubes H01J 7/24, H01J 19/74)

Circuits (of television transmitters H04N 5/38; oscillators H03B; modulators H03C 1/00, H03C 3/00, H03C 5/00; amplifiers H03F; power supplies H04B 1/1607)

{ Arrangements for matching and coupling between power amplifier and antenna or between amplifying stages (matching circuits in general H03H) }

{ Fault detection or indication (H04B 1/0483 takes precedence) }

{ with means for limiting noise, interference or distortion (H04B 1/0483 takes precedence) }

{ Transmitters with multiple parallel paths }

Receivers (control of amplification H03G; television receivers H04N 5/44, H04N 5/64)

Constructional details, e.g. cabinet

{ to be used in vehicles (H04B 1/086 takes precedence; holding or mounting accessories B60R 11/02) }

Portable receivers

{ with parts of the receiver detachable or collapsible }

Means associated with receiver for limiting or suppressing noise or interference (induced by transmission (interference reduction in spread spectrum systems H04B 1/707F; equalising on HF or IF H04B 7/005; diversity systems H04B 7/02; elimination of image frequencies H03D 7/18; noise suppression by control of amplification H03G 3/00, H03G 5/00, H03G 7/00; squelching H03G 3/26, H03G 3/34))

{ 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) }

{ noise filters connected between the power supply and the receiver (suppression or limitation of noise from electric apparatus H04B 15/00; demodulation H03D; ripple filters H02M 1/14; filters in general 95G, H03H; power supplies H04B 1/1607) }

{ assessing signal quality or detecting noise/interference for the received signal }

{ with automatic suppression of narrow band noise or interference, e.g. by using tuneable notch filters (H04B 1/123 takes precedence; filter circuits H03H) }

{ Reduction of multipath noise (by equalising H04B 7/005) }

{ by improving strong signal performance of the receiver when strong unwanted signals are present at the receiver input }

Neutralising, balancing, or compensation arrangements (balancing ripple filters H04B 15/005, H02M 1/143)

{ using adaptive balancing or compensation means (adaptive filter circuits and algorithms H03H) }

{ having multiple inputs, e.g. auxiliary antenna for receiving interfering }
signal (aerials in general H01Q)

H04B 1/14 ... Automatic detuning arrangements

H04B 1/16 ... Circuits (demodulators H03D)

H04B 1/1607 ... {Supply circuits (converters 92P, 92Q, H02M; filters therefor H02M 1/14; voltage stabilisers G05F 1/46)}

H04B 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)}

H04B 1/1623 ... {using tubes}

H04B 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)}

H04B 1/1638 ... {Special circuits to enhance selectivity of receivers not otherwise provided for (resonant circuits H03H)}

H04B 1/1646 ... {adapted for the reception of stereophonic signals}

H04B 1/1653 ... {Detection of the presence of stereo signals and pilot signal regeneration}

H04B 1/1661 ... {Reduction of noise by manipulation of the baseband composite stereophonic signal or the decoded left and right channels}

H04B 1/1669 ... ... {of the demodulated composite stereo signal}

H04B 1/1676 ... ...... {of the sum or difference signal}

H04B 1/1684 ... ...... {of the decoded left or right stereo channel}

H04B 1/1692 ... ...... {using companding of the stereo difference signal, e.g. FMX (volume compression or expansion in amplifiers H03G 7/00)}

H04B 1/18 ... Input circuits, e.g. for coupling to an aerial or a transmission line (input circuits for amplifiers in general H03F; coupling networks between aerials or lines and receivers independent of the nature of the receiver H03H)

H04B 1/20 ... for coupling gramophone pick-up, recorder output, or microphone to receiver, {e.g. for Hi-Fi systems or audio/video combinations (constructional details for associated working of receivers and recording devices G11B 31/00; for television signals only H04N 5/00)}

H04B 1/202 ... ... ... {by remote control}

H04B 1/205 ... ... ... {with control bus for exchanging commands between units}

H04B 1/207 ... ... ... {with an audio or audio/video bus for signal distribution (H04B 1/205 takes precedence)}

H04B 1/22 ... ... for receivers in which no local oscillation is generated

H04B 1/24 ... ... the receiver comprising at least one semiconductor device having three or more electrodes

H04B 1/26 ... ... for superheterodyne receivers (multiple frequency-changing H03D 7/16)

H04B 1/28 ... ... the receiver comprising at least one semiconductor device having three or more electrodes

H04B 1/30 ... ... for homodyne or synchronodyne receivers (demodulator circuits H03D 1/22)

H04B 1/302 ... ... {for single sideband receivers (demodulator circuits H03D 1/24)}

H04B 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 {construction of portable transceivers H04B 1/034; specially adapted to be fitted into airplanes B64D 43/00; paging systems G08B 3/10; traffic between a small number of stations with amplifiers or loudspeakers H04M 9/00; A; selecting arrangements for radio-calling systems H04W; wireless communication networks H04W}
H04B 1/3805  . .  { with built-in auxiliary receivers }
H04B 1/3816  . .  { Mechanical arrangements for accommodating identification devices e.g. cards, chips; with connectors for programming identification devices }
H04B 1/3822  . .  { for being used in vehicles  ( H04B 1/3827 takes precedence; holding or mounting accessories B60R 11/02 ) }
H04B 1/3827  . .  { Portable transceivers }
H04B 1/3833  . .  { Hand-held transceivers }
H04B 1/3838  . .  { arrangements for reducing RF exposure to the user, e.g. by changing the shape of the transceiver while in use ( means for shaping the antenna pattern H01Q 1/245 ) }
H04B 1/385  . .  { Transceivers carried on the body, e.g. in helmets }
H04B 1/3877  . .  { Arrangements for converting portable transceivers for other use, e.g. fixed or mobile use }
H04B 1/3883  . .  { Arrangements for mounting batteries or battery chargers }
H04B 1/3888  . .  { Arrangements for carrying or protecting transceivers }
H04B 1/40  . .  Circuits
H04B 1/401  . .  { for selecting or indicating operating mode }
H04B 1/403  . .  { using the same oscillator for generating the transmitter frequency as well as the receiver local oscillator frequency }
H04B 1/405  . .  { with multiple discrete channels }
H04B 1/406  . .  { with more than one transmission mode, e.g. analog and digital modes }
H04B 1/408  . .  { the transmitter oscillator frequency being identical to the receiver local oscillator frequency }
H04B 1/44  . .  Transmit/receive switching ( { in radar systems G01S 7/034 } ; tubes therefor H01J 17/64 ; waveguide switches H01P 1/10 )
H04B 1/46  . .  by voice-frequency signals ; by pilot signals ( { echo suppression H04B 3/20 )
H04B 1/48  . .  in circuit for connecting transmitter and receiver to a common transmission path, e.g. by energy of transmitter ( in radar systems G01S ; { H04B 1/46 takes precedence ) }
H04B 1/50  . .  using different frequencies for the two directions of communication
H04B 1/52  . .  Hybrid arrangements, i.e. for transition from single-path two-way transmission to single transmission on each of two path, or vice-versa { ( multiport networks H03H 7/46 ; microwave multiplexers H01P 1/213 ) }
H04B 1/525  . .  { with means for reducing leakage of transmitter signal into the receiver ( for repeater stations H04B 7/155B ) }
H04B 1/54  . .  using the same frequency for both directions of communication ( H04B 1/44 takes precedence )
H04B 1/56  . .  with provision for simultaneous communication in both directions
H04B 1/58  . .  Hybrid arrangements, i.e. for transition from single-path two-way transmission to single transmission on each of two paths, or vice-versa { ( multiport networks H03H 7/48 ; for two-way amplifiers H03F 3/62 ; in multiplex communication H04J 1/10 ; balance/unbalance networks H03H 7/42, H03H 11/32 ; construction of transformers 95G2, H01F ; conjugate coupling devices of the waveguide type H01P 5/16 ) }
H04B 1/581  . .  { using a transformer }
H04B 1/582  . .  { with automatic balancing }
H04B 1/583  . .  { using a bridge network }
H04B 1/585  
  .  .  .  .  .  .  .  
  \{ with automatic balancing \}

H04B 1/586  
  .  .  .  .  .  .  .  
  \{ using an electronic circuit \}

H04B 1/587  
  .  .  .  .  .  .  .  
  \{ using opto-couplers ( light transmission systems H04B 10/00 ) \}

H04B 1/588  
  .  .  .  .  .  .  .  
  \{ using sampling gates \}

H04B 1/59  
  Responders ; Transponders ( relay systems H04B 7/14 )

**WARNING**

contains no documents, see provisionally G01S 13/74

H04B 1/60  
  .  .  .  .  .  .  .  
  \{ Supervising unattended repeaters \}

H04B 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 \{ ( for optical transmitters H04B 10/155L ) \}

H04B 1/64  
  .  .  .  .  .  .  .  
  \{ Volume compression or expansion arrangements \{ ( for amplifiers H04B 7/00 ) \}

H04B 1/66  
  .  .  .  .  .  .  .  
  \{ for reducing bandwidth of signals ( in pictorial communication systems H04N ) ; for improving efficiency of transmission ( H04B 1/68 takes precedence ; \{ vocoders 42T2B, G10L \} )

H04B 1/662  
  .  .  .  .  .  .  .  
  \{ using a time/frequency relationship, e.g. time compression or expansion \}

H04B 1/665  
  .  .  .  .  .  .  .  
  \{ using psychoacoustic properties of the ear, e.g. masking effect \}

H04B 1/667  
  .  .  .  .  .  .  .  
  \{ using a division in frequency subbands ( for TV signals H04N 7/26388 ) \}

H04B 1/68  
  .  .  .  .  .  .  .  
  \{ for wholly or partially suppressing the carrier or one side band \{ or by using special modulation methods ( modulator circuits H03C 1/52 , H03C 1/60 ; single sideband receivers H04B 1/302 ; for data transmission H04L 27/02 ) \}

H04B 1/69  
  .  .  .  .  .  .  .  
  \{ Spread spectrum techniques \}

H04B 1/692  
  .  .  .  .  .  .  .  
  \{ Hybrid techniques using combinations of two or more spread spectrum techniques \}

**WARNING**

Not complete pending the completion of reclassification; see also group H04B 1/69

H04B 1/707  
  .  .  .  .  .  .  .  
  \{ using direct sequence modulation \}

H04B 1/70712  
  .  .  .  .  .  .  .  
  \{ with demodulation by means of convolvers, e.g. of the SAW type ( SAW convolvers in general G06G 7/195 ) \}

H04B 1/70718  
  .  .  .  .  .  .  .  
  \{ with asynchronous demodulation, i.e. not requiring code synchronisation \}

H04B 1/7073  
  .  .  .  .  .  .  .  
  \{ Synchronisation aspects \}

H04B 1/70735  
  .  .  .  .  .  .  .  
  \{ Code identification ( H04B 1/7083 takes precedence ) \}

H04B 1/7075  
  .  .  .  .  .  .  .  
  \{ with code phase acquisition \}

H04B 1/70751  
  .  .  .  .  .  .  .  
  \{ using partial detection ( H04B 1/70758 takes precedence ) \}

H04B 1/70752  
  .  .  .  .  .  .  .  
  \{ Partial correlation \}

H04B 1/70753  
  .  .  .  .  .  .  .  
  \{ Partial phase search \}

H04B 1/70754  
  .  .  .  .  .  .  .  
  \{ Setting of search window, i.e. range of code offsets to be searched ( H04B 1/70758 takes precedence ) \}

H04B 1/70755  
  .  .  .  .  .  .  .  
  \{ Setting of lock conditions, e.g. threshold \}
Jumping within the code, i.e. masking or slewing (H04B 1/70758 takes precedence)

with increased resolution, i.e. higher than half a chip (H04B 1/70758 takes precedence)

Multimode search, i.e. using multiple search strategies

Multi-step acquisition, e.g. multi-dwell, coarse-fine or validation

Multi-dwell schemes, i.e. multiple accumulation times

Parallel implementation

Cell search, e.g. using a three-step approach

using a code tracking loop, e.g. a delay-locked loop

Carrier synchronisation aspects

Correlator structure

Matched filter type

Sliding correlator type

Interference-related aspects

the interference being narrowband interference

with estimation filters

with transform to frequency domain

the interference being multiple access interference

Joint detection techniques, e.g. linear detectors

using decorrelation matrix

using minimum mean squared error (MMSE) detector

using maximum-likelihood sequence estimation (MLSE)

Subtractive interference cancellation

Successive interference cancellation

Parallel interference cancellation

the interference being multi-path interference

Determination of path profile

Constructive combining of multi-path signals, i.e. RAKE receivers

Selection, re-selection, allocation or re-allocation of paths to fingers, e.g. timing offset control of allocated fingers

Weighting of fingers for combining, e.g. amplitude control or phase rotation using an inner loop

using frequency hopping

Arrangements for generation of hop frequencies, e.g. using a bank of frequency sources, using continuous tuning or using a transform

Arrangements for generation of hop patterns

Interference-related aspects

Arrangements for sequence synchronisation

using impulse radio

WARNING

As from 01/04/2011 documents relating to pulse-related aspects are classified in H04B 1/717 and the backlog for such documents is continuously being reclassified from H04B 1/7163
H04B 1/71632 . . . { Signal aspects ( H04B 1/7172 and H04B 1/7176 take precedence ) }
H04B 1/71635 . . . { Transmitter aspects ( H04B 1/7174 takes precedence ) }
H04B 1/71637 . . . { Receiver aspects ( H04B 1/7183 takes precedence ) }
H04B 1/717 . . . Pulse-related aspects

**WARNING**

Not complete pending the completion of reclassification; see also group H04B 1/7163

H04B 1/7172 . . . { Pulse shape ( in general H04L 25/03834 ) }
H04B 1/7174 . . . { Pulse generation ( in general H04L 25/03834 ) }
H04B 1/7176 . . . Data mapping, e.g. modulation
H04B 1/7183 . . . Synchronisation
H04B 1/719 . . . Interference-related aspects

H04B 1/72 . Circuits or components for simulating aerials, e.g. dummy aerial ( dissipative waveguide terminations H01P 1/26 )

**WARNING**

contains no documents, see H03H, e.g. H03H 7/38, H03H 11/28

H04B 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 ) }
H04B 1/745 . . { using by-passing or self-healing methods }
H04B 1/76 . Pilot transmitters or receivers for control of transmission or for equalising

**H04B 3/00** Line transmission systems ( combined with near-field transmission systems H04B 5/00 ; constructional features of cables H01B 11/00 )

H04B 3/02 . Details
H04B 3/03 . . Hybrid circuits ( for transceivers H04B 1/52, H04B 1/58 ; hybrid junctions of the waveguide type H01P 5/16 )

**WARNING**

not used, see H04B 1/52, H04B 1/58

H04B 3/04 . . Control of transmission ; Equalising ( control of amplification in general H03G )
H04B 3/06 . . by the transmitted signal
H04B 3/08 . . . in negative-feedback path of line amplifier
H04B 3/10 . . by pilot signal
H04B 3/11 . . . using pilot wire ( H04B 3/12 takes precedence )
H04B 3/12 . . . in negative-feedback path of line amplifier
H04B 3/14 . . characterised by the equalising network used
{ using multiequalisers, e.g. bump, cosine, Bode }

{ using echo-equalisers, e.g. transversal }

{ using amplitude-frequency equalisers }

{ fixed equalizers }

{ variable equalisers }

{ using phase-frequency equalisers }

{ fixed equalisers }

{ variable equalisers }

characterised by the negative-impedance network used wherein the network comprises semiconductor devices

Reducing echo effects or singing; Opening or closing transmitting path; Conditioning for transmission in one direction or the other

using a set of bandfilters

using a replica of transmitted signal in the time domain, e.g. echo cancellers

Echo cancellers using readout of a memory to provide the echo replica

{ using phase shift, phase roll or frequency offset correction }

{ using double talk detection }

{ combined with adaptive equaliser }

{ using two adaptive filters, e.g. for near end and for end echo cancelling }

{ using initial training sequence }

Improving frequency characteristic by the use of loading coils (loading coils per se H01F 17/08)

Reducing interference caused by currents induced in cable sheathing or armouring

Reducing interference caused by unbalance current in a normally balanced line

Reducing cross-talk, e.g. by compensating

by systematic interconnection of lengths of cable during laying; by addition of balancing components to cable during laying

Repeater circuits (H04B 3/58 takes precedence; amplifiers therefor H03F)

for signals in two different frequency ranges transmitted in opposite directions over the same transmission path

Artificial lines; Networks simulating a line of certain length

Circuits for by-passing of ringing signals

Arrangements for feeding power to a repeater along the transmission line

Monitoring; Testing

{ Testing group delay or phase shift, e.g. timing jitter (H04B 3/46 takes precedence) }

{ Testing crosstalk effects }

{ Testing simultaneously attenuation and group delay or phase shift }

{ Testing echo effects or singing (reducing echo effects or singing H04B 3/20) }

Testing attenuation

Systems for transmission between fixed stations via two-conductor transmission lines (H04B 3/54 takes precedence)

Systems for transmission between fixed stations via waveguides
H04B 3/54 . Systems for transmission via power distribution lines
H04B 3/542 .. { the information being in digital form }
H04B 3/544 .. { Setting up communications; Call and signalling arrangements }
H04B 3/546 .. { Combination of signalling, telemetering, protection (circuits for remote indication of supply or distribution network condition H02J 13/00) }
H04B 3/548 .. { the power on the line being DC (arrangements for feeding power H04B 10/00P; extracting feeding power from signals H04L 25/02) }
H04B 3/56 .. Circuits for coupling, blocking, or by-passing of signals
H04B 3/58 .. Repeater circuits (amplifiers therefor H03F)

H04B 3/60 . Systems for communication between relatively movable stations, e.g. for communication with lift (H04B 3/54 takes precedence)

H04B 5/00 Near-field transmission systems, e.g. inductive loop type

H04B 5/0006 . { using a receiver structurally associated with a loudspeaker or an earphone }
H04B 5/0012 . { using capacitive coupling }
H04B 5/0018 . { using leaky or radiating cables, e.g. leaky coaxial cables or power lines for inductive transmission (leaky cables per se H01Q 13/20; for railways B61L 3/22) }

H04B 5/0025 . { Near field system adaptations }
H04B 5/0031 .. { for data transfer }
H04B 5/0037 .. { for power transfer }
H04B 5/0043 .. { for taking measurements, e.g. using sensor coils }
H04B 5/005 .. { for isolation purposes }

H04B 5/0056 .. { for use in interrogation, identification or read/write systems (record carriers G06K 7/00, G06K 19/00; for railways B61L 3/12) }
H04B 5/0062 .. { in RFID [Radio Frequency Identification] systems]
H04B 5/0068 .. { in transponders }

H04B 5/0075 .. { using inductive coupling (transformers or inductances adapted for inductive coupling H01F 38/14) }
H04B 5/0081 .. { with antenna coils (loop aerials H01Q 7/00) }
H04B 5/0087 .. { with multiple coils at either side }
H04B 5/0093 .. { with one coil at each side, e.g. with primary and secondary coils }

H04B 5/02 . using transceiver
H04B 5/04 . Calling systems, e.g. paging system
H04B 5/06 . using a portable transmitter associated with a microphone

H04B 7/00 Radio transmission systems, i.e. using radiation field (H04B 10/00, H04B 15/00 take precedence)
Reducing depolarization effects

Control of transmission; Equalising

Reducing phase shift

Reducing echo effects

Diversity systems (for direction finding G01S 3/72; aerial arrays or systems H01Q; reducing multipath interference in spread spectrum systems H04B 1/707F3; specially adapted for satellite systems H04B 7/18534; for telegraphy or data transmission H04L 1/02)

Site diversity, e.g. macro-diversity (for co-located independent aerials H04B 7/04)

Cooperative use of antennas of several nodes, e.g. in coordinated multipoint or cooperative MIMO [Multiple Input Multiple Output]

Cooperative diversity, e.g. using fixed or mobile stations as relays (cooperative coding H04L 1/0077, relays per se in CoMP H04B 7/15592)

Spatial transmit diversity using a single antenna at the transmitter

Using a plurality of spaced independent aerials

The mobile station comprising multiple antennas (e.g. aspects of uplink diversity)

Using a plurality of beams, e.g. beam diversity

Multiple input multiple output [MIMO] systems

Feedback systems

Utilizing implicit feedback, e.g. steered pilot signals

Power distribution aspects

Using best eigenmode, e.g. beam forming or beam steering

Using multiple eigenmodes

Utilizing channel inversion

Utilizing "waterfilling" technique

Utilizing uniform distribution

Multiple user MIMO systems

Selection of precoding matrix or codebook, e.g. using matrices for antenna weighting (codebook-based design for spatial equalizers at the transmitter H04L 25/03898)

Taking physical layer constraints into account

Taking power constraints at power amplifier or emission constraints, e.g. constant modulus, into account

Taking special antenna structures, e.g. cross polarized antennas into account

Taking constraints in layer or codeword to antenna mapping into
H04B 7/0478 . . . . . . { Special codebook structures directed to feedback optimization }
H04B 7/0482 . . . . . . { Adaptive codebooks }
H04B 7/0486 . . . . . . { taking channel rank into account }
H04B 7/0491 . . . . . . { using a plurality of sectors, e.g. sector diversity }
H04B 7/0495 . . . . . . { using overlapping sectors in the same base station to implement MIMO antennas }
H04B 7/06 . . . . . . at transmitting station, e.g. time diversity
H04B 7/0602 . . . . . . { using antenna switching ( H04B 7/0686 takes precedence; antenna beam directivity switching H01Q 3/24 ) }
H04B 7/0604 . . . . . . { with predefined switching scheme }
H04B 7/0606 . . . . . . { Random or pseudo-random switching scheme }
H04B 7/0608 . . . . . . { Antenna selection according to transmission parameters }
H04B 7/0601 . . . . . . { using feedback from receiving side }
H04B 7/0613 . . . . . . { using simultaneous transmission ( H04B 7/0686 takes precedence ) }
H04B 7/0615 . . . . . . { of weighted versions of same signal }
H04B 7/0617 . . . . . . { for beam forming }
H04B 7/0619 . . . . . . { using feedback from receiving side ( feedback signaling for adaptive modulation/coding H04L 1/0001 ) }
H04B 7/0621 . . . . . . { Feedback content }
H04B 7/0623 . . . . . . { Auxiliary parameters, e.g. power control (PCB) or not acknowledged commands (NACK), used as feedback information }
H04B 7/0626 . . . . . . { Channel coefficients, e.g. channel state information (CSI) }
H04B 7/0628 . . . . . . { Diversity capabilities }
H04B 7/063 . . . . . . { Parameters other than those covered in groups H04B 7/0623 - H04B 7/0634, e.g. channel matrix rank or transmit mode selection }
H04B 7/0632 . . . . . . { Channel quality parameters, e.g. channel quality indicator (CQI) }
H04B 7/0634 . . . . . . { Antenna weights or vector/matrix coefficients }
H04B 7/0636 . . . . . . { Feedback format }
H04B 7/0639 . . . . . . { Using selective indices, e.g. of a codebook, e.g. pre-distortion matrix index (PMI) or for beam selection }
H04B 7/0641 . . . . . . { Differential feedback }
H04B 7/0643 . . . . . . { Feedback on request }
H04B 7/0645 . . . . . . { Variable feedback }
H04B 7/0647 . . . . . . { Variable feedback rate }
H04B 7/065 . . . . . . { Variable contents, e.g. long-term or short-short }
H04B 7/0652 . . . . . . { Feedback error handling }
H04B 7/0654 . . . . . . { at the receiver, e.g. antenna verification at mobile station }
H04B 7/0656 . . . . . . { at the transmitter, e.g. error detection at base station }
H04B 7/0658 . . . . . . { Feedback reduction }
H04B 7/066 . . . . . . { Combined feedback for a number of channels, e.g. over several subcarriers like in orthogonal frequency division }
multiplexing (OFDM)

{ using vector or matrix manipulations }

{ Feed forward of transmit weights to the receiver }

{ of delayed versions of same signal ( using space-time coding H04L 1/0618 ) }

{ using different channel coding between antennas ( space-time coding H04L 1/0618 ) }

{ using different delays between antennas }

{ using feedback from receiving side }

{ using random or pseudo-random delays }

{ using different spreading codes between antennas ( code allocation T04J 11/00B4 and T04J 13/00B4 ) }

{ using space frequency diversity ( space-frequency coding H04L 1/0606 ) }

{ using phase diversity ( e.g. phase sweeping ) }

{ using different training sequences per antenna }

{ Hybrid systems, i.e. switching and simultaneous transmission }

{ using different transmission schemes, at least one of them being a diversity transmission scheme }

{ using subgroups of transmit antennas }

{ switching off a diversity branch, e.g. to save power }

{ using beam selection }

{ using spatial multiplexing }

{ Hybrid systems, i.e. switching and simultaneous transmission }

at receiving station, e.g. space diversity

{ using antenna selection ( H04B 7/0868 takes precedence; antenna beam directivity switching H01Q 3/24 ) }

{ with single receiver and antenna switching ( H04B 7/0822 takes precedence ) }

{ comparing all antennas before reception }

{ during preamble or gap period }

{ based on current reception conditions, e.g. switching to different antenna when signal level is below threshold }

{ with multiple receivers and antenna path selection }

{ selecting best antenna path }

{ according to predefined selection scheme }

{ with main and with auxiliary or diversity antennas }

{ with delay elements in antenna paths }

{ Compensation of the diversity switching process for non-uniform properties or faulty operations of the switches used in the diversity switching process }

{ based on external parameters, e.g. subscriber speed or location }

{ using pre-detection combining ( H04B 7/0868 takes precedence ) }

{ Equal gain combining, only phase adjustments ( antenna beam scanning or forming by phase or amplitude control H01Q 3/26 , e.g. phased arrays ) }

{ Weighted combining }
per branch equalization, e.g. by an FIR-filter or RAKE receiver per antenna branch (rake receivers as such H04B 1/707F3)

Joint weighting

using training sequences or error signal (minimizing error signal H04B 7/0854)

using error minimizing algorithms, e.g. minimum mean squared error (MMSE), "cross-correlation" or matrix inversion

using maximum ratio combining techniques, e.g. signal-to-interference ratio (SIR), received signal strength indication (RSS)

using weights depending on external parameters, e.g. direction of arrival (DOA), predetermined weights or beamforming

receiver computing weights based on information from the transmitter

Independent weighting, i.e. weights based on own antenna reception parameters

Hybrid systems, i.e. switching and combining

using different reception schemes, at least one of them being a diversity reception scheme

using subgroups of receive antennas

switching off a diversity branch, e.g. to save power

using beam selection

using post-detection diversity

with combination

with selection

Space-time diversity (rake receivers H04B 1/707F3; space-time decoding H04L 1/0631)

using different delays between antennas

using beamforming per multi-path, e.g. to cope with different directions of arrival [DOA] at different multi-paths

using a single aerial system characterised by its polarisation or directive properties, e.g. polarisation diversity, direction diversity

Frequency-diversity systems

Relay systems (interrogator-responder radar systems G01S 13/74; CATV (community antenna television) systems H04H 20/78; adapted for television H04N 7/20)

Passive relay systems (construction of passive reflectors G01S 13/02A)

Active relay systems

Ground-based stations (H04B 7/204 takes precedence; for satellite systems H04B 7/18517)

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)

for shadowing compensation (for satellite mobile telephony service systems H04B 7/18536)

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 )

H04B 7/15528 .... ( Control of operation parameters of a relay station to exploit the physical medium )

H04B 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 ) )

H04B 7/15542 .... ( Selecting at relay station its transmit and receive resources ( selection of wireless resources by user or terminal H04W 72/04B ; 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 ) )

H04B 7/1555 .... ( Selecting relay station antenna mode e.g. selecting omnidirectional -, directional beams, selecting polarizations )

H04B 7/15557 .... ( Selecting relay station operation mode e.g. between amplify and forward mode, decode and forward mode or FDD - and TDD mode )

H04B 7/15564 .... ( Relay station antennae loop interference reduction )

H04B 7/15571 .... ( by signal isolation e.g. isolation by frequency or by antenna pattern, or by polarization )

H04B 7/15578 .... ( by gain adjustment )

H04B 7/15585 .... ( by interference cancellation )

H04B 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 ) )

H04B 7/165 .... employing angle modulation

H04B 7/17 .... employing pulse modulation, e.g. pulse code modulation

H04B 7/185 ... Space-based or airborne stations; ( Stations for satellite systems ) ( H04B 7/204 takes precedence )

H04B 7/18502 .... ( Airborne stations )

H04B 7/18504 .... ( Aircraft used as relay or high altitude atmospheric platform )

H04B 7/18506 .... ( Communications with or from aircraft, i.e. aeronautical mobile service )

H04B 7/18508 .... ( with satellite system used as relay, i.e. aeronautical mobile satellite service )

H04B 7/1851 .... ( Systems using a satellite or space-based relay ( H04B 7/18508 , H04B 7/18521 take precedence; providing specific services H04B 7/18523 to H04B 7/18576 ) )

H04B 7/18513 .... ( Transmission in a satellite or space-based system )

H04B 7/18515 .... ( Transmission equipment in satellites or space-based relays )

H04B 7/18517 .... ( Transmission equipment in earth stations )

H04B 7/18519 .... ( Operations control, administration or maintenance )

H04B 7/18521 .... ( Systems of inter linked satellites, i.e. inter satellite service ( for optical links between satellites H04B 10/105 ) )

H04B 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 ) )

H04B 7/18526 .... ( Arrangements for data linking, networking or transporting, or for
controlling an end to end session (data switching networks H04L 12/00)

H04B 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
H04B 7/1853 .... Satellite systems for providing telephony service to a mobile station, i.e. mobile satellite service (for selecting H04W)
H04B 7/18532 .... Arrangements for managing transmission, i.e. for transporting data or a signalling message
H04B 7/18534 .... for enhancing link reliability, e.g. satellites diversity
H04B 7/18536 .... Shadowing compensation therefor, e.g. by using an additional terrestrial relay
H04B 7/18539 .... Arrangements for managing radio, resources, i.e. for establishing or releasing a connection
H04B 7/18541 .... for handover of resources
H04B 7/18543 .... for adaptation of transmission parameters, e.g. power control (for detecting or preventing errors in the information received H04L 1/00)
H04B 7/18545 .... Arrangements for managing station mobility, i.e. for station registration or localisation
H04B 7/18547 .... for geolocalisation of a station (position fixing by direction or distance determination G01S 5/00)
H04B 7/1855 .... using a telephonic control signal, e.g. propagation delay variation, Doppler frequency variation, power variation, beam identification
H04B 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)
H04B 7/18554 .... using the position provided by an existing geolocalisation system
H04B 7/18556 .... using a location database
H04B 7/18558 .... Arrangements for managing communications, i.e. for setting up, maintaining or releasing a call between stations
H04B 7/1856 .... for call routing
H04B 7/18563 .... Arrangements for interconnecting multiple systems (data switching networks H04L 12/00)
H04B 7/18565 .... Arrangements for preventing unauthorised access or for providing user protection (arrangements for secret or secure communication H04L 9/00)
H04B 7/18567 .... Arrangements for providing additional services to the basic mobile satellite telephony service
H04B 7/18569 .... Arrangements for system physical machines management, i.e. for construction operations control, administration, maintenance
H04B 7/18571 .... for satellites; for fixed or mobile stations
H04B 7/18573 .... for operations control, administration or maintenance
H04B 7/18576 .... Satellite systems for providing narrowband data service to fixed or mobile stations, e.g. using a minisatellite, a microsatellite (for selecting H04W)
H04B 7/18578 .... Satellite systems for providing broadband data service to individual earth stations (for selecting H04W; provisions for broadband connection, H04Q 11/0478)
H04B 7/1858 .... Arrangements for data transmission on the physical system, i.e. for data
layer transmission capacity (H04B 7/2615 to H04B 7/2643 take precedence; provision for broadband connection H04Q 11/0478 )

H04B 7/2615 . . . { using hybrid frequency-time division multiple access [FDMA-TDMA ] }
H04B 7/2618 . . . { using hybrid code-time division multiple access [CDMA-TDMA ] }
H04B 7/2621 . . . { using frequency division multiple access [FDMA ] (H04B 7/2615 takes precedence) }
H04B 7/2625 . . . { using common wave }
H04B 7/2628 . . . { using code-division multiple access [CDMA ] or spread spectrum multiple access [SSMA] (H04B 7/2618 takes precedence) }
H04B 7/2631 . . . { for broadband transmission }
H04B 7/2634 . . . { for channel frequency control }
H04B 7/2637 . . . { for logical channel control }
H04B 7/264 . . . { for data rate control }
H04B 7/2643 . . . { using time-division multiple access [TDMA ] (H04B 7/2615 , H04B 7/2618 take precedence) }
H04B 7/2646 . . . { for broadband transmission }
H04B 7/265 . . . { for channel frequency control }
H04B 7/2653 . . . { for logical channel control }
H04B 7/2656 . . . { for structure of frame, burst }
H04B 7/2659 . . . { for data rate control }
H04B 7/2662 . . . { Arrangements for Wireless System Synchronisation }
H04B 7/2665 . . . { Arrangements for Wireless Frequency Division Multiple Access (FDMA) System Synchronisation }
H04B 7/2668 . . . { Arrangements for Wireless Code-Division Multiple Access (CDMA) System Synchronisation, for code acquisition H04B 1/707A , for code tracking H04B 1/707B }
H04B 7/2671 . . . { Arrangements for Wireless Time-Division Multiple Access (TDMA) System Synchronisation }
H04B 7/2675 . . . { Frequency synchronisation }
H04B 7/2678 . . . { Time synchronisation }
H04B 7/2681 . . . { Synchronisation of a mobile station with one base station }
H04B 7/2684 . . . { Synchronisation of a mobile station with more than one base station }
H04B 7/2687 . . . { Inter base stations synchronisation }
H04B 7/269 . . . { Master/slave synchronisation }
H04B 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 }
H04B 7/2696 . . . { Over the air autonomous synchronisation, e.g. by monitoring network activity (H04B 7/2693 takes preference) }

H04B 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
Groups H04B 10/03, H04B 10/07, H04B 10/11, H04B 10/25, H04B 10/27, H04B 10/29 and H04B 10/40 to H04B 10/90, and their subgroups are based on IPC2013.01

**WARNING**

Group H04B 10/2572 does not correspond to former or current IPC groups. Concordance CPC:IPC for this group is as follows: - H04B 10/2572 : H04B 10/2507

**H04B 10/03**

. Arrangements for fault recovery

**WARNING**

This group and its subgroups are not complete pending reclassification; see also H04B 10/07 and subgroups H04B 10/071 - H04B 10/0799

**H04B 10/032**

.. using working and protection systems { ( H04J 14/0287 takes precedence ) }

**H04B 10/035**

.. using loopbacks

**H04B 10/038**

.. using bypasses

**H04B 10/07**

. Arrangements for monitoring or testing transmission systems ; Arrangements for fault measurement of transmission systems

**H04B 10/0705**

.. { Prevention or detection of unauthorized access, e.g. tapping }

**H04B 10/071**

.. using a reflected signal, e.g. using optical time-domain reflectometers [OTDRs]

**H04B 10/073**

.. using an out-of-service signal ( H04B 10/071 takes precedence )

**H04B 10/0731**

... { Testing or characterisation of optical devices, e.g. amplifiers }

**H04B 10/075**

.. using an in-service signal ( H04B 10/071 takes precedence )

**H04B 10/077**

... using a supervisory or additional signal

**H04B 10/0771**

.... { Fault location on the transmission path }

**H04B 10/0773**

.... { Network aspects, e.g. central monitoring of transmission parameters }

**H04B 10/0775**

.... { Performance monitoring and measurement of transmission parameters }

**H04B 10/0777**

.... { Monitoring line amplifier or line repeater equipment }

**H04B 10/0779**

.... { Monitoring line transmitter or line receiver equipment }

**H04B 10/079**

... using measurements of the data signal

**H04B 10/0791**

.... { Fault location on the transmission path }

**H04B 10/0793**

.... { Network aspects, e.g. central monitoring of transmission parameters }

**H04B 10/0795**

.... { Performance monitoring; Measurement of transmission parameters }

**H04B 10/07951**

..... { Monitoring or measuring chromatic dispersion or PMD }

**H04B 10/07953**

..... { Monitoring or measuring OSNR, BER or Q }

**H04B 10/07955**

..... { Monitoring or measuring power }

**H04B 10/07957**

..... { Monitoring or measuring wavelength }

**H04B 10/0797**

.... { Monitoring line amplifier or line repeater equipment }

**H04B 10/0799**

.... { Monitoring line transmitter or line receiver equipment }

**H04B 10/11**

. Arrangements specific to free-space transmission, i.e. transmission through air or vacuum
<table>
<thead>
<tr>
<th>CPC Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>H04B 10/112</td>
<td>Line-of-sight transmission over an extended range</td>
</tr>
<tr>
<td>H04B 10/1121</td>
<td>{ One-way transmission }</td>
</tr>
<tr>
<td>H04B 10/1123</td>
<td>{ Bidirectional transmission }</td>
</tr>
<tr>
<td>H04B 10/1125</td>
<td>{ using a single common optical path }</td>
</tr>
<tr>
<td>H04B 10/1127</td>
<td>{ using two distinct parallel optical paths }</td>
</tr>
<tr>
<td>H04B 10/1129</td>
<td>{ Arrangements for outdoor wireless networking of information }</td>
</tr>
<tr>
<td>H04B 10/114</td>
<td>Indoor or close-range type systems</td>
</tr>
<tr>
<td>H04B 10/1141</td>
<td>{ One-way transmission }</td>
</tr>
<tr>
<td>H04B 10/1143</td>
<td>{ Bidirectional transmission }</td>
</tr>
<tr>
<td>H04B 10/1149</td>
<td>{ Arrangements for indoor wireless networking of information }</td>
</tr>
<tr>
<td>H04B 10/116</td>
<td>Visible light communication</td>
</tr>
</tbody>
</table>

**WARNING**

This group is not complete pending reclassification; see also H04B 10/114 and its other subgroups.

<table>
<thead>
<tr>
<th>CPC Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>H04B 10/118</td>
<td>specially adapted for satellite communication</td>
</tr>
</tbody>
</table>

**WARNING**

This group and its subgroups is no longer used for classification of new documents as from March 1, 2012. The backlog of this group and its subgroups is being continuously reclassified to H04B 10/25 - H04B 10/2587.

<table>
<thead>
<tr>
<th>CPC Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>H04B 10/12</td>
<td>( Transmission through light guides, e.g. optical fibres ) ( H04B 10/25 takes precedence )</td>
</tr>
</tbody>
</table>

**WARNING**

This group and its subgroups is no longer used for classification of new documents as from March 1, 2012. If not indicated differently for a particular subgroup, the backlog of its subgroups is being continuously reclassified to H04B 10/25 - H04B 10/2587 and H04B 10/70.

<table>
<thead>
<tr>
<th>CPC Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>H04B 10/14</td>
<td>Terminal stations</td>
</tr>
</tbody>
</table>

**WARNING**

This group and its subgroups is no longer used for classification of new documents as from March 1, 2012. The backlog of this group and its subgroups is being continuously reclassified to H04B 10/40 - H04B 10/69.

<table>
<thead>
<tr>
<th>CPC Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>H04B 10/142</td>
<td>Coherent homodyne or heterodyne systems</td>
</tr>
<tr>
<td>H04B 10/152</td>
<td>Non-coherent direct-detection systems</td>
</tr>
</tbody>
</table>

**WARNING**

This group and its subgroup is no longer used for classification of new documents as from March 1, 2012. The backlog of this group and its subgroup is being continuously reclassified to H04B 10/25 - H04B 10/2587 and H04B 10/70.

<table>
<thead>
<tr>
<th>CPC Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>H04B 10/22</td>
<td>Transmission between two stations which are mobile relative to each other</td>
</tr>
</tbody>
</table>

**WARNING**

This group and its subgroup is no longer used for classification of new documents as from March 1, 2012. The backlog of this group and its subgroup is being continuously reclassified to H04B 10/25 - H04B 10/2587 and H04B 10/70.

<table>
<thead>
<tr>
<th>CPC Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>H04B 10/225</td>
<td>{ using optical fibre links }</td>
</tr>
</tbody>
</table>

**WARNING**

This group and its subgroup is no longer used for classification of new documents as from March 1, 2012. The backlog of this group and its subgroup is being continuously reclassified to H04B 10/25 - H04B 10/2587 and H04B 10/70.

<table>
<thead>
<tr>
<th>CPC Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>H04B 10/25</td>
<td>Arrangements specific to fibre transmission ( { optical fibres per se, structural details of arrangements comprising optical fibres or other optical elements G02B 6/00 } )</td>
</tr>
</tbody>
</table>
WARNING

This group and its subgroups are not complete pending reclassification; see also H04B 10/12 and its subgroups

H04B 10/2503 . . . { Bidirectional transmission }
H04B 10/2504 . . . { Transmission components ( H04B 10/40 takes precedence ) }
H04B 10/2507 . . . for the reduction or elimination of distortion or dispersion
H04B 10/25073 . . . { using spectral equalisation, e.g. spectral filtering }
H04B 10/25077 . . . { using soliton propagation }
H04B 10/2513 . . . due to chromatic dispersion
H04B 10/25133 . . . . { including a lumped electrical or optical dispersion compensator ( H04B 10/2519 , H04B 10/2525 take precedence ) ; optical dispersion compensators involving optical fibres per se G02B 6/293 }
H04B 10/25137 . . . . { using pulse shaping at the transmitter, e.g. pre-chirping or dispersion supported transmission [DST ] }
H04B 10/2519 . . . . using Bragg gratings { ( Bragg gratings per se G02B 6/02076 ; devices using fibre gratings for dispersion control per se G02B 6/29316 ) }
H04B 10/2525 . . . . using dispersion-compensating fibres { ( dispersion-tailored or dispersion compensation fibres per se G02B 6/02214 ) }
H04B 10/25253 . . . . . { with dispersion management, i.e. using a combination of different kind of fibres in the transmission system ( devices with different kinds of fibres for dispersion control per se G02B 6/29374 ) }
H04B 10/2531 . . . . using spectral inversion
H04B 10/2537 . . . . due to scattering processes, e.g. Raman or Brillouin scattering
H04B 10/2543 . . . . due to fibre non-linearities, e.g. Kerr effect { ( non-linear optical devices G02F 1/35 ) }
H04B 10/255 . . . . Self-phase modulation [SPM]
H04B 10/2557 . . . . Cross-phase modulation [XPM]
H04B 10/2563 . . . . Four-wave mixing [FWM]
H04B 10/2569 . . . . due to polarisation mode dispersion [PMD]
H04B 10/2572 . . . . { due to forms of polarisation-dependent distortion other than PMD }
H04B 10/2575 . . . . Radio-over-fibre, e.g. radio frequency signal modulated onto an optical carrier { ( sub-carrier multiplexing H04J 14/0298 ) }
H04B 10/25751 . . . . { Optical arrangements for CATV or video distribution ( adaptations of television systems for optical transmission H04N 7/22 ) }
H04B 10/25752 . . . . { Optical arrangements for wireless networks }
H04B 10/25753 . . . . { Distribution optical network, e.g. between a base station and a plurality of remote units ( WDM networks in general H04J 14/0278 ) }
H04B 10/25754 . . . . . { Star network topology }
H04B 10/25755 . . . . . { Ring network topology }
H04B 10/25756 . . . . . { Bus network topology }
H04B 10/25758 . . . . . { between a central unit and a single remote unit by means of an optical fibre }
H04B 10/25759 . . . . . { Details of the reception of RF signal or the optical conversion before the optical fibre }
Multimode transmission (mode multiplex systems H04J 14/04)

Arrangements for networking (free-space networks H04B 10/11, WDM networks H04J 14/0278, specific to radio-over-fibre H04B 10/25753)

Combination of different networks, e.g. star and ring configuration in the same network or two ring networks interconnected

Star-type networks (or tree-type networks)

Star-type networks without a headend

Ring-type networks

Ring-type networks with a headend

Bus-type networks

Repeaters in which processing or amplification is carried out without conversion of the main signal from optical form (fibre optical amplifiers per se H01S 3/067)

Characterised by the medium used for amplification or processing

Using lumped semiconductor optical amplifiers [SOA] (semiconductor optical amplifiers per se H01S 5/50)

Using Raman or Brillouin amplifiers (Raman or Brillouin amplifiers per se H01S 3/302)

Two-way repeaters, i.e. repeaters amplifying separate upward and downward lines

Signal power control

Using AGC (H04B 10/294 takes precedence)

Considering the whole optical path

With a cascade of amplifiers

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

Network aspects

In a multiwavelength system, e.g. gain equalisation (for general power control in WDM systems, see also H04J 14/0221)

Using an equalising unit, e.g. a filter (H04B 10/296 takes precedence)

Using automatic gain control [AGC] (H04B 10/296 takes precedence)

Transient power control, e.g. due to channel add/drop or rapid fluctuations in the input power

Bidirectional amplification

A single amplifier for both directions

Each direction being amplified separately

Signal waveform processing, e.g. reshaping or retiming

Transmission systems employing beams of corpuscular radiation (arrangements for handling beams of corpuscular radiation, e.g. focusing, moderating, G21K 1/00)

WARNING
This group is no longer used for classification of new documents as from March 1, 2012. The backlog of this group and its subgroups is being continuously reclassified to H04B 10/80 and H04B 10/90.

H04B 10/40 . Transceivers
H04B 10/43 ... using a single component as both light source and receiver, e.g. using a photoemitter as a photoreceiver

H04B 10/50 . Transmitters
H04B 10/501 ... { Structural aspects }
H04B 10/502 ... { LED transmitters }
H04B 10/503 ... { Laser transmitters }
H04B 10/504 ... { using direct modulation }
H04B 10/505 ... { using external modulation }
H04B 10/5051 ... { using a series, i.e. cascade, combination of modulators }
H04B 10/5053 ... { using a parallel, i.e. shunt, combination of modulators }
H04B 10/5055 ... { using a pre-coder }
H04B 10/5057 ... { using a feedback signal generated by analysing the optical output }
H04B 10/50572 ... { to control the modulating signal amplitude including amplitude distortion }
H04B 10/50575 ... { to control the modulator DC bias }
H04B 10/50577 ... { to control the phase of the modulating signal }
H04B 10/5059 ... { using a feed-forward signal generated by analysing the optical or electrical input }
H04B 10/50593 ... { to control the modulating signal amplitude including amplitude distortion }
H04B 10/50595 ... { to control the modulator DC bias }
H04B 10/50597 ... { to control the phase of the modulating signal }
H04B 10/506 ... { Multi-wavelength transmitters ( WDM systems in general H04J 14/02 ) }
H04B 10/508 ... Pulse generation, e.g. generation of solitons
H04B 10/516 ... Details of coding or modulation
H04B 10/5161 ... { Combination of different modulation schemes }
H04B 10/5162 ... { Return-to-zero modulation schemes }
H04B 10/5165 ... { Carrier suppressed; Single sideband; Double sideband or vestigial }
H04B 10/5167 ... { Duo-binary; Alternative mark inversion; Phase shaped binary transmission }
H04B 10/524 ... Pulse modulation
H04B 10/532 ... Polarisation modulation { e.g. polarization switching or transmission of a single data stream on two orthogonal polarizations ( polarization multiplexed systems H04J 14/06 ) }
H04B 10/54 ... Intensity modulation
H04B 10/541 ... { Digital intensity or amplitude modulation }
H04B 10/548 ... Phase or frequency modulation
H04B 10/556 ... Digital modulation, e.g. differential phase shift keying [DPSK] or frequency
shift keying [FSK]

H04B 10/5561 . . . . ( Digital phase modulation )
H04B 10/5563 . . . . ( Digital frequency modulation )
H04B 10/564 . . Power control
H04B 10/572 . . Wavelength control
H04B 10/58 . . Compensation for non-linear transmitter output
H04B 10/588 . . . . in external modulation systems

H04B 10/60 . Receivers
H04B 10/61 . . Coherent receivers { i.e., optical receivers using an optical local oscillator ( delay line interferometer based DPSK optical receivers H04B 10/677 ) }
H04B 10/611 . . { Intradyne, i.e., coherent receivers with a free running local oscillator having a frequency close but not phase-locked to the carrier signal }
H04B 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 }
H04B 10/613 . . { including phase diversity, e.g., having in-phase and quadrature branches, as in QPSK coherent receivers }
H04B 10/614 . . { comprising one or more polarization beam splitters, e.g. polarization multiplexed [PDMux] X-PSK coherent receivers, polarization diversity heterodyne coherent receivers ( H04J 14/06 takes precedence ) }
H04B 10/615 . . { Arrangements affecting the optical part of the receiver ( adjustment of the frequency or phase of the local oscillator in homodyne receivers H04B 10/63 , use of polarization beam splitters H04B 10/614 ) }
H04B 10/6151 . . . . ( comprising a polarization controller at the receiver's input stage )
H04B 10/616 . . { Details of the electronic signal processing in coherent optical receivers }
H04B 10/6161 . . . . ( Compensation of chromatic dispersion )
H04B 10/6162 . . . . ( Compensation of polarization related effects, e.g., PMD, PDL )
H04B 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] )
H04B 10/6164 . . . . ( Estimation or correction of the frequency offset between the received optical signal and the optical local oscillator )
H04B 10/6165 . . . . ( Estimation of the phase of the received optical signal, phase error estimation or phase error correction )
H04B 10/6166 . . . . ( Polarization demultiplexing, tracking or alignment of orthogonal polarization components ( polarisation multiplex systems H04J 14/06 ) )
H04B 10/63 . . . . Homodyne { , i.e., coherent receivers where the local oscillator is locked in frequency and phase to the carrier signal }
H04B 10/64 . . . . Heterodyne { , i.e., coherent receivers where, after the opto-electronic conversion, an electrical signal at an intermediate frequency [IF] is obtained }
H04B 10/66 . . Non-coherent receivers, e.g. using direct detection
H04B 10/67 . . . . Optical arrangements in the receiver
H04B 10/671 . . . . ( for controlling the input optical signal )
H04B 10/672 . . . . ( for controlling the power of the input optical signal )
H04B 10/673 . . . . ( using an optical preamplifier )
H04B 10/674 . . . . ( using a variable optical attenuator )
H04B 10/675 . . . . ( for controlling the optical bandwidth of the input signal, e.g. spectral filtering )
H04B 10/676 . . . . { for all-optical demodulation of the input optical signal }
H04B 10/677 . . . . { for differentially modulated signal, e.g. DPSK signals }
H04B 10/69 . . . . Electrical arrangements in the receiver
H04B 10/691 . . . . { Arrangements for optimizing the photodetector in the receiver }
H04B 10/6911 . . . . { Photodiode bias control, e.g. for compensating temperature variations }
H04B 10/693 . . . . { Arrangements for optimizing the preamplifier in the receiver }
H04B 10/6931 . . . . { Automatic gain control of the preamplifier }
H04B 10/6932 . . . . { Bandwidth control of bit rate adaptation }
H04B 10/6933 . . . . { Offset control of the differential preamplifier }
H04B 10/695 . . . . { Arrangements for optimizing the decision element in the receiver, e.g. by using automatic threshold control }
H04B 10/697 . . . . { Arrangements for reducing noise and distortion }
H04B 10/6971 . . . . { using equalisation }
H04B 10/6972 . . . . { using passive filtering }
H04B 10/6973 . . . . { using noise matching networks }

H04B 10/70 . . . . Photonic quantum communication

**WARNING**

N1202] This group is not complete pending reclassification; see also H04B 10/30

H04B 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
H04B 10/801 . . . . { using optical interconnects, e.g. light coupled isolators, circuit board interconnections }
H04B 10/802 . . . . { for isolation, e.g. using optocouplers }
H04B 10/803 . . . . { Free space interconnects, e.g. between circuit boards or chips }
H04B 10/806 . . . . { Arrangements for feeding power }
H04B 10/807 . . . . { Optical power feeding, i.e. transmitting power using an optical signal }
H04B 10/808 . . . . { Electrical power feeding of an optical transmission system (power feeding arrangements in general H04B 3/44) }
H04B 10/85 . . . . Protection from unauthorised access, e.g. eavesdrop protection
H04B 10/90 . . . . Non-optical transmission systems, e.g. transmission systems employing non-photonic corpuscular radiation

**WARNING**

This group is not complete pending reclassification; see also H04B 10/30

H04B 11/00 . . . . Transmission systems employing sonic, ultrasonic or infrasonic waves

H04B 13/00 . . . . Transmission systems characterised by the medium used for transmission, not provided for in groups H04B 3/00 to H04B 11/00
H04B 13/005. (Transmission systems in which the medium consists of the human body)

H04B 13/02. Transmission systems in which the medium consists of the earth or a large mass of water thereon, e.g. earth telegraphy (line transmission systems with earth or water return H04B 3/00; geophysics, detecting hidden masses G01H, G01V 1/16, G01V 1/18, G01V 3/00; sonars G01S 1/72, H05F 7/00; direction and distance determination with lead cables G01S 13/00)

H04B 14/00 Transmission systems not characterised by the medium used for transmission (details thereof H04B 1/00)

H04B 14/002. (characterised by the use of a carrier modulation (using subcarrier modulation H04B 14/08))

H04B 14/004. {Amplitude modulation}

H04B 14/006. {Angle modulation}

H04B 14/008. {Polarisation modulation}

H04B 14/02. Characterised by the use of pulse modulation (in radio transmission relays H04B 7/17; transmission of digital information per se H04L)

H04B 14/023. {Using pulse amplitude modulation}

H04B 14/026. {Using pulse time characteristics modulation, e.g. width, position, interval}

H04B 14/04. Using pulse code modulation (analogue/digital or digital/analogue conversion per se H03M 1/00; for TV signals H04N 7/24)

H04B 14/042. {Special circuits, e.g. comparators}

H04B 14/044. {Sample and hold circuits (in general G11C 27/02)}

H04B 14/046. {Systems or methods for reducing noise or bandwidth}

H04B 14/048. {Non linear compression or expansion}

H04B 14/06. Using differential modulation, e.g. delta modulation (conversion of analogue values to or from differential modulation H03M 3/00)

H04B 14/062. {Using delta modulation or one-bit differential modulation [1DPCM]}

H04B 14/064. {With adaptive feedback}

H04B 14/066. {Using differential modulation with several bits (NDPCM)}

H04B 14/068. {With adaptive feedback}

H04B 14/08. Characterised by the use of a sub-carrier

H04B 15/00 Suppression or limitation of noise or interference (by means associated with receiver H04B 1/10)

H04B 15/005. {Reducing noise e.g. humm, from the supply}

H04B 15/02. Reducing interference from electric apparatus by means located at or near the interfering apparatus (structural association with dynamo-electric machines H02K 11/00)

H04B 15/025. {Reducing interference from ignition apparatus of fuel engines (cables with high resistance H01B)}

H04B 15/04. The interference being caused by substantially sinusoidal oscillations, e.g. in a receiver, in a tape-recorder (reducing parasitic oscillations H03B, H03F)
screening H05K 9/00 )

H04B 15/06 ... by local oscillators of receivers

H04B 17/00 Monitoring ; Testing

H04B 17/0002 ... { of transmitters ( H04B 17/0082 takes precedence ) }
H04B 17/0005 ... { for calibration }
H04B 17/0007 ... { of transmit antennas, e.g. of the amplitude or phase }
H04B 17/001 ... { of power amplifier, e.g. gain or non-linearities }
H04B 17/0012 ... { of the whole transmission and reception path, e.g. self-test loop-back }
H04B 17/0015 ... { of other elements, e.g. filter calibration or I/Q mismatch }
H04B 17/0017 ... { for performance testing }
H04B 17/002 ... { Test equipment at the transmitter }
H04B 17/0022 ... { Detection of faulty performance, e.g. under performance or response deviations }
H04B 17/0025 ... { Monitoring during normal operation }
H04B 17/0027 ... { Self-testing arrangements }
H04B 17/003 ... { for measurement of parameters }
H04B 17/0032 ... { of radiated power at antenna port }
H04B 17/0035 ... { of reflected power, e.g. return loss }
H04B 17/0037 ... { of other parameters, e.g. DC offset, delay or propagation times }

H04B 17/004 ... { of receivers ( H04B 17/0082, H04B 17/009 take precedence ) }
H04B 17/0042 ... { Measuring channel quality parameters }
H04B 17/0045 ... { Signal code power and other power values per channel }
H04B 17/0047 ... { Delay profiles }
H04B 17/005 ... { Interference values }
H04B 17/0052 ... { Adjacent channel leakage power }
H04B 17/0055 ... { Noise values }
H04B 17/0057 ... { Received signal strength }
H04B 17/006 ... { Estimation of signal-to-interference ratio [SIR] or carrier-to-interference ratio [CIR] }
H04B 17/0062 ... { Calibrating or correcting measurements }
H04B 17/0065 ... { Indication means, e.g. displays, alarms, audible means }
H04B 17/0067 ... { with feedback of measurements to the transmitter ( for modifying transmission characteristics H04L 1/0026, for allocation of payload in multicarrier systems H04L 27/2608 ) }

H04B 17/007 ... { using historical readings, averaging values or statistics }
H04B 17/0072 ... { for locating or positioning the transmitter }
H04B 17/0075 ... { Predicting channel quality parameters }
H04B 17/0077 ... { for resource allocation, admission control or handover }
H04B 17/008 ... { for testing the receiver RF performance }
H04B 17/0082 ... { using a service channel or an auxiliary channel }
Guidance heading:

**H04B 2001/00** Details of transmission systems, not covered by a single one of groups **H04B 3/00** to **H04B 13/00**; Details of transmission systems not characterised by the medium used for transmission (tuning resonant circuits **H03J**)

**NOTE**

In this group, group **H04B 1/0003** takes precedence over groups **H04B 1/005** to **H04B 1/76**

**H04B 2001/02** Transmitters (spatial arrangements of component circuits in radio pills for living beings **A61B 5/07**)

**H04B 2001/04** Circuits (of television transmitters **H04N 5/38**; oscillators **H03B**; modulators **H03C 1/00**, **H03C 3/00**, **H03C 5/00**; amplifiers **H03F**; power supplies **H04B 1/1607**)

**H04B 2001/0408** with power amplifiers

**H04B 2001/0416** having gain or transmission power control

**H04B 2001/0425** with linearisation using predistortion

**H04B 2001/0433** with linearisation using feedback

**H04B 2001/0441** with linearisation using feed-forward

**H04B 2001/045** with means for improving efficiency

**H04B 2001/0491** with frequency synthesizers, frequency converters or modulators

**H04B 2001/06** Receivers (control of amplification **H03G**; television receivers **H04N 5/44**, **H04N 5/64**)

**H04B 2001/08** Constructional details, e.g. cabinet
H04B 2001/082  ...  { to be used in vehicles (H04B 1/086 takes precedence; holding or mounting accessories B60R 11/02 ) }
H04B 2001/084  ..  with removable front panel
H04B 2001/10  ..  Means associated with receiver for limiting or suppressing noise or interference { induced by transmission (interference reduction in spread spectrum systems H04B 1/707F; equalising on HF or IF H04B 7/005; diversity systems H04B 7/02; elimination of image frequencies H03D 7/18; noise suppression by control of amplification H03G 3/00, H03G 5/00, H03G 7/00; squelching H03G 3/26, H03G 3/34) }
H04B 2001/1027  ...  { assessing signal quality or detecting noise/interference for the received signal }
H04B 2001/1045  ...  Adjacent-channel interference
H04B 2001/1054  ...  by changing bandwidth
H04B 2001/1063  ...  using a notch filter
H04B 2001/1072  ...  by tuning the receiver frequency
H04B 2001/16  ..  Circuits { (demodulators H03D) }
H04B 2001/30  ...  for homodyne or synchronyce receivers (demodulator circuits H03D 1/22)
H04B 2001/305  ...  using dc offset compensation techniques
H04B 2001/307  ...  using n-port mixer
H04B 2001/38  ..  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 { (construction of portable transceivers H04B 1/034; specially adapted to be fitted into airplanes B64D 43/00; paging systems G08B 3/10; traffic between a small number of stations with amplifiers or loudspeakers H04M 9/00A; selecting arrangements for radio-calling systems H04W; wireless communication networks H04W) }
H04B 2001/3805  ...  { with built-in auxiliary receivers }
H04B 2001/3811  ...  Split configuration of transmission devices
H04B 2001/3827  ..  { Portable transceivers }
H04B 2001/3833  ...  { Hand-held transceivers }
H04B 2001/3838  ...  { arrangements for reducing RF exposure to the user, e.g. by changing the shape of the transceiver while in use (means for shaping the antenna pattern H01Q 1/245) }
H04B 2001/3844  ....  with an alert to the user that a certain exposure has been reached
H04B 2001/385  ...  { Transceivers carried on the body, e.g. in helmets }
H04B 2001/3855  ...  Portable transmission device carried in a belt or harness
H04B 2001/3861  ...  Portable transmission device carried on a hand or finger
H04B 2001/3866  ...  Portable transmission device or transceiver carried on the head
H04B 2001/3872  ...  Portable transmission device with extendable microphone or earphone
H04B 2001/3894  ..  Waterproofing of transmission device
H04B 2001/40  ..  Circuits
H04B 2001/44  ...  Transmit/receive switching { (in radar systems G01S 7/034); tubes therefor H01J 17/64; waveguide switches H01P 1/10) }
H04B 2001/48  ...  in circuit for connecting transmitter and receiver to a common transmission path, e.g. by energy of transmitter (in radar systems G01S; (H04B 1/46 takes precedence) }
H04B 2001/485  ...  inhibiting unwanted transmission
H04B 2001/69  ..  Spread spectrum techniques
using code hopping
using time hopping
using chirp
Related theory
using direct sequence modulation
using a code tracking loop, e.g. a delay locked loop
featuring pilot assisted reception
Synchronisation aspects
using a code tracking loop, e.g. a delay-locked loop
Dithering
Correlator structure
Matched filter type
using a bank of matched filters, e.g. Fast Hadamard Transform
Interference-related aspects
the interference being multiple access interference
Subtractive interference cancellation
Partial interference cancellation
using frequency hopping
Arrangements for generation of hop frequencies, e.g. using a bank of frequency sources, using continuous tuning or using a transform
using a bank of frequency sources
using continuous tuning of a single frequency source
using a transform
Interference-related aspects
with means for suppressing interference
with means for preventing interference
Arrangements for sequence synchronisation
Acquisition
Tracking

Guidance heading:

Indexing scheme relating to details of transmission systems not covered by a single group of **H04B 3/00** to **H04B 13/00**

Orthogonal indexing scheme relating to spread spectrum techniques in general
Cognitive radio
WPAN
relating to Dowlink
relating to Uplink
relating to direct sequence modulation
featuring pilot assisted reception
Intercell-related aspects
using multiple or variable rates
Rate detection
with means for reducing the peak-to-average power ratio
Efficiency-related aspects
with discontinuous detection
with dynamic control of receiver resources
with modular structure
Reducing computational requirements
Reducing hardware requirements
with application-specific features
Quadrature
Particular systems or standards
CDMA2000
HDR
HSDPA/HSUPA
Multi-carrier HSPA
UMTS
Asynchronous CDMA
using fast Fourier transform
Frequency aspects
Direct sequence modulation synchronisation
2D search
DSA
Direct sequence modulation interference
Methods of preventing interference
Determine interference
GRAKE type RAKE receivers
Hybrid interference mitigation schemes
Iterative interference mitigation schemes
Blind joint detection
Joint detection using feedback
Joint detection using feedforward
Linear detectors for joint detection
Fat finger issues in RAKE receivers
Frequency hopping
Partial band interference
Wide band interference
Adaptive systems
Asymmetric systems
Asynchronous systems
Bluetooth
Fast frequency hopping
H04B 2203/00  Indexing scheme relating to line transmission systems

H04B 2203/54  Aspects of powerline communications not already covered by H04B 3/54 and its subgroups (not used)
H04B 2203/5404  Methods of transmitting or receiving signals via power distribution lines
H04B 2203/5408  using protocols
H04B 2203/5412  by modifying wave form of the power source
H04B 2203/5416  by adding signals to the wave form of the power source
H04B 2203/542  using zero crossing information
H04B 2203/5425  improving S/N by matching impedance, noise reduction, gain control
H04B 2203/5429  Applications for powerline communications
H04B 2203/5433  Remote metering
H04B 2203/5437  Wired telephone
H04B 2203/5441  Wireless systems or telephone
H04B 2203/5445  Local network
H04B 2203/545  Audio/video application, e.g. interphone
H04B 2203/5454  Adapter and plugs
H04B 2203/5458  Monitor sensor; Alarm systems
H04B 2203/5462  Systems for power line communications
H04B 2203/5466  using three phases conductors
H04B 2203/547  via DC power distribution
H04B 2203/5475  adapted for drill or well combined with data transmission
H04B 2203/5479  using repeaters
H04B 2203/5483  using coupling circuits
H04B 2203/5487  cables
H04B 2203/5491  using filtering and bypassing
H04B 2203/5495  having measurements and testing channel

H04B 2210/00  Indexing scheme relating to optical transmission systems
H04B 2210/003 Devices including multiple stages, e.g., multi-stage optical amplifiers or dispersion compensators

H04B 2210/006 Devices for generating or processing an RF signal by optical means

H04B 2210/07 Monitoring an optical transmission system using a supervisory signal (OAM for WDM transmission H04J 14/0272)

H04B 2210/071 using alarms
H04B 2210/072 using an overhead signal
H04B 2210/074 using a superposed, over-modulated signal
H04B 2210/075 using a pilot tone
H04B 2210/077 using a separate fibre
H04B 2210/078 using a separate wavelength

H04B 2210/08 Shut-down or eye-safety

H04B 2210/25 Distortion or dispersion compensation
H04B 2210/252 after the transmission line, i.e. post-compensation
H04B 2210/254 before the transmission line, i.e. pre-compensation
H04B 2210/256 at the repeater, i.e. repeater compensation
H04B 2210/258 treating each wavelength or wavelength band separately

H04B 2210/516 Optical conversion of optical modulation formats, e.g., from optical ASK to optical PSK
H04B 2210/517 Optical NRZ to RZ conversion, or vice versa

**Guidance heading:**

**H04B 2215/00** Reducing interference at the transmission system level

H04B 2215/061 Reduction of burst noise, e.g. in TDMA systems
H04B 2215/062 by inhibiting burst transmission
H04B 2215/063 by smoothing the transmission power envelope

H04B 2215/064 Reduction of clock or synthesizer reference frequency harmonics
H04B 2215/065 by changing the frequency of clock or reference frequency
H04B 2215/066 by stopping a clock generator
H04B 2215/067 by modulation dispersion
H04B 2215/068 by avoiding a reception frequency range

H04B 2215/069 Reduction of switch mode power supply ripple