

**CPC****COOPERATIVE PATENT CLASSIFICATION****H04B**

**TRANSMISSION** (transmission systems for measured values, control or similar signals [G08C](#); coding, decoding, code conversion, in general [H03M](#); broadcast communication [H04H](#); multiplex systems [H04J](#); secret communication [H04K](#); transmission of digital information [H04L](#))

**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.

**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}

**H04B 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](#))}

**H04B 1/0014**

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

**H04B 1/0017**

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

**H04B 1/0021**

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

**H04B 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](#))}

**H04B 1/0028**

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

- H04B 1/0032 ... {with analogue quadrature frequency conversion to and from the baseband (quadrature modulators and demodulators per se [H03D 3/007](#), [H03C 3/40](#))}
- H04B 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](#))}
- H04B 1/0039 ... {using DSP [Digital Signal Processor] quadrature modulation and demodulation}
- H04B 1/0042 ... {Digital filtering ([H04B 1/0035](#) takes precedence; digital filters per se [H03H 17/00](#))}
- H04B 1/0046 ... {Decimation, i.e. data rate reduction techniques}
- H04B 1/005 ... {adapting radio receivers, transmitters and transceivers for operation on two or more bands, i.e. frequency ranges}
- H04B 1/0053 .. {with common antenna for more than one band}
- H04B 1/0057 ... {using diplexing or multiplexing filters for selecting the desired band}
- H04B 1/006 ... {using switches for selecting the desired band ([H04B 1/0057](#) takes precedence)}
- H04B 1/0064 .. {with separate antennas for the more than one band ([H04B 1/0053](#) takes precedence)}
- H04B 1/0067 .. {with one or more circuit blocks in common for different bands}
- H04B 1/0071 ... {using a common intermediate frequency for more than one band ([H04B 1/0075](#) takes precedence)}
- H04B 1/0075 ... {using different intermediate frequency for the different bands}
- H04B 1/0078 .... {with a common intermediate frequency amplifier for the different intermediate frequencies, e.g. when using switched intermediate frequency filters}
- H04B 1/0082 ... {with a common local oscillator for more than one band}
- H04B 1/0085 .... {where one band is the image frequency band of the other and the band selection is done by image rejection}
- H04B 1/0089 .... {using a first intermediate frequency higher than the highest of any band received}
- H04B 1/0092 ..... {using a wideband front end}
- H04B 1/0096 .. {where a full band is frequency converted into another full band}
- H04B 1/02 ... Transmitters (spatial arrangements of component circuits in radio pills for living beings [A61B 5/07](#))
- H04B 1/03 .. Constructional details, e.g. casings, housings {(adapted for airplanes [B64D](#))}
- H04B 1/034 ... Portable transmitters {(distress beacons [G01S 1/68](#); means for indicating the location of accidentally buried persons [A63B 29/021](#))}
- H04B 1/0343 .... {to be carried on the body}
- H04B 1/0346 .... {Hand-held transmitters}
- H04B 1/036 ... Cooling arrangements (cooling transformers [H01F 27/08](#); cooling discharge tubes [H01J 7/24](#), [H01J 19/74](#))
- H04B 1/04 .. 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 1/0458    | ...  | {Arrangements for matching and coupling between power amplifier and antenna or between amplifying stages (matching circuits in general <a href="#">H03H</a> )}  |
| H04B 1/0466    | ...  | {Fault detection or indication ( <a href="#">H04B 1/0483</a> takes precedence)}   |
| H04B 1/0475    | ...  | {with means for limiting noise, interference or distortion ( <a href="#">H04B 1/0483</a> takes precedence)}   |
| H04B 1/0483    | ...  | {Transmitters with multiple parallel paths}   |
| H04B 2001/0491 | ...  | {with frequency synthesizers, frequency converters or modulators}   |
| H04B 1/06      | .    | Receivers (control of amplification <a href="#">H03G</a> ; television receivers <a href="#">H04N 5/44</a> , <a href="#">H04N 5/64</a> )   |
| H04B 1/08      | ..   | Constructional details, e.g. cabinet  |
| H04B 1/082     | ...  | {to be used in vehicles ( <a href="#">H04B 1/086</a> takes precedence; holding or mounting accessories <a href="#">B60R 11/02</a> )}  |
| H04B 2001/084  | .... | {with removable front panel}  |
| H04B 1/086     | ...  | {Portable receivers}  |
| H04B 1/088     | .... | {with parts of the receiver detachable or collapsible}  |
| H04B 1/10      | ..   | Means associated with receiver for limiting or suppressing noise or interference {induced by transmission (interference reduction in spread spectrum systems <a href="#">H04B 1/7097</a> ; equalising on HF or IF <a href="#">H04B 7/005</a> ; diversity systems <a href="#">H04B 7/02</a> ; elimination of image frequencies <a href="#">H03D 7/18</a> ; noise suppression by control of amplification <a href="#">H03G 3/00</a> , <a href="#">H03G 5/00</a> , <a href="#">H03G 7/00</a> ; squelching <a href="#">H03G 3/26</a> , <a href="#">H03G 3/34</a> )} |
| H04B 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 <a href="#">H01Q 7/04</a> ; feeders for aerials <a href="#">H01Q 9/00</a> )}  |
| H04B 1/1018    | ...  | {noise filters connected between the power supply and the receiver (suppression or limitation of noise from electric apparatus <a href="#">H04B 15/00</a> ; demodulation <a href="#">H03D</a> ; ripple filters <a href="#">H02M 1/14</a> ; filters in general <a href="#">95G</a> , <a href="#">H03H</a> ; power supplies <a href="#">H04B 1/1607</a> )}  |
| H04B 1/1027    | ...  | {assessing signal quality or detecting noise/interference for the received signal}  |
| H04B 1/1036    | .... | {with automatic suppression of narrow band noise or interference, e.g. by using tuneable notch filters ( <a href="#">H04B 1/123</a> takes precedence; filter circuits <a href="#">H03H</a> )}   |
| 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 1/1081    | ...  | {Reduction of multipath noise (by equalising <a href="#">H04B 7/005</a> )}  |
| H04B 1/109     | ...  | {by improving strong signal performance of the receiver when strong unwanted signals are present at the receiver input}   |
| H04B 1/12      | ...  | Neutralising, balancing, or compensation arrangements {(balancing ripple filters <a href="#">H04B 15/005</a> , <a href="#">H02M 1/143</a> )}  |

|             |       |  |
|-------------|-------|--|
| H04B 1/123  | ....  | {using adaptive balancing or compensation means (adaptive filter circuits and algorithms <a href="#">H03H</a> )}   |
| H04B 1/126  | ..... | {having multiple inputs, e.g. auxiliary antenna for receiving interfering signal (aerials in general <a href="#">H01Q</a> )}   |
| H04B 1/14   | ...   | Automatic detuning arrangements  |
| H04B 1/16   | ..    | Circuits {(demodulators <a href="#">H03D</a> )}  |
| H04B 1/1607 | ...   | {Supply circuits (converters <a href="#">H02M</a> ; filters therefor <a href="#">H02M 1/14</a> ; voltage stabilisers <a href="#">G05F 1/46</a> )}  |
| H04B 1/1615 | ....  | {Switching on; Switching off, e.g. remotely (battery saving circuits associated with selective call operation <a href="#">H04W 52/00</a> ; details of power consumption reduction in a PLL, <a href="#">H03L 7/0802</a> , <a href="#">H03L 7/14</a> , <a href="#">H03L 2207/08</a> , <a href="#">H03L 2207/18</a> ; muting amplifiers by gain control see <a href="#">H03G 3/34</a> )} |
| H04B 1/1623 | ....  | {using tubes}  |
| H04B 1/163  | ...   | {Special arrangements for the reduction of the damping of resonant circuits of receivers (amplifiers <a href="#">H03F</a> ; negative impedance networks for line transmission systems <a href="#">H04B 3/16</a> )}   |
| H04B 1/1638 | ...   | {Special circuits to enhance selectivity of receivers not otherwise provided for (resonant circuits <a href="#">H03H</a> )}  |
| 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 <a href="#">H03G 7/00</a> )}  |
| H04B 1/18   | ...   | Input circuits, e.g. for coupling to an aerial or a transmission line (input circuits for amplifiers in general <a href="#">H03F</a> ; coupling networks between aerials or lines and receivers independent of the nature of the receiver <a href="#">H03H</a> )   |
| 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 <a href="#">G11B 31/003</a> ; for television signals only <a href="#">H04N 5/00</a> )}  |
| 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 ( <a href="#">H04B 1/205</a> 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 <a href="#">H03D 7/16</a> )   |
| H04B 1/28   | ....  | the receiver comprising at least one semiconductor device having three or more electrodes  |
| H04B 1/30   | ...   | for homodyne or synchrodyne receivers (demodulator circuits <a href="#">H03D 1/22</a> )  |

- H04B 1/302 . . . . {for single sideband receivers (demodulator circuits [H03D 1/24](#))}
- H04B 2001/305 . . . . {using dc offset compensation techniques}
- H04B 2001/307 . . . . {using n-port mixer}
- 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
- H04B 1/3805 . . with built-in auxiliary receivers
- H04B 2001/3811 . . . {Split configuration of transmission devices}
- H04B 1/3816 . . Mechanical arrangements for accommodating identification devices, e.g. cards or chips; with connectors for programming identification devices
- H04B 1/3818 . . . Arrangements for facilitating insertion or removal of identification devices

### **WARNING**

Group [H04B 1/3818](#) is incomplete pending reclassification of documents from group [H04B 1/3816](#)

Until reclassification is complete, groups [H04B 1/3816](#) and [H04B 1/3818](#) should be considered in order to perform a complete search

- H04B 1/3822 . . specially adapted for use in vehicles ([H04B 1/3827](#) takes precedence)
- 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}
- H04B 2001/3844 . . . . . {with means to alert the user that a certain exposure has been reached}
- H04B 1/385 . . . {Transceivers carried on the body, e.g. in helmets}
- H04B 2001/3855 . . . . {carried in a belt or harness}
- H04B 2001/3861 . . . . {carried in a hand or on fingers}
- H04B 2001/3866 . . . . {carried on the head}
- H04B 2001/3872 . . . . {with extendable microphones or earphones}
- H04B 1/3877 . . . Arrangements for enabling portable transceivers to be used in a fixed position, e.g. cradles or boosters
- H04B 1/3883 . . . Arrangements for mounting batteries or battery chargers
- H04B 1/3888 . . . Arrangements for carrying or protecting transceivers
- H04B 2001/3894 . . {Waterproofing of transmission device}
- H04B 1/40 . . Circuits
- H04B 1/401 . . . for selecting or indicating operating mode
- H04B 1/403 . . . using the same oscillator for generating both the transmitter frequency and 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
- H04B 1/46 . . . . by voice-frequency signals; by pilot signals

- H04B 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)}
- H04B 2001/485 . . . . . {inhibiting unwanted transmission}
- H04B 1/50 . . . using different frequencies for the two directions of communication
- H04B 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 vice versa
- H04B 1/525 . . . . . with means for reducing leakage of transmitter signal into the receiver
- H04B 1/54 . . . using the same frequency for two directions of communication (H04B 1/44 takes precedence)
- H04B 1/56 . . . . with provision for simultaneous communication in two directions
- H04B 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 vice versa
- 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 10/58)}
- H04B 1/64 . . . Volume compression or expansion arrangements {(for amplifiers H03G 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 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 19/63)}
- 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 2001/6904 . . . {using code hopping}
- H04B 2001/6908 . . . {using time hopping}
- H04B 2001/6912 . . . {using chirp}
- H04B 2001/6916 . . . {Related theory}

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 2001/70706 ... {using a code tracking loop, e.g. a delay locked loop}

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 2001/70724 ... {featuring pilot assisted reception}

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}

H04B 1/70756 ..... {Jumping within the code, i.e. masking or slewing ([H04B 1/70758](#) takes precedence)}

H04B 1/70757 ..... {with increased resolution, i.e. higher than half a chip ([H04B 1/70758](#) takes precedence)}

H04B 1/70758 ..... {Multimode search, i.e. using multiple search strategies}

H04B 1/7077 ..... Multi-step acquisition, e.g. multi-dwell, coarse-fine or validation

H04B 1/70775 ..... {Multi-dwell schemes, i.e. multiple accumulation times}

H04B 1/708 ..... Parallel implementation

H04B 1/7083 .... Cell search, e.g. using a three-step approach

H04B 1/7085 .... using a code tracking loop, e.g. a delay-locked loop

H04B 2001/70855 ..... {Dithering}

H04B 1/7087 .... Carrier synchronisation aspects

H04B 1/709 ... Correlator structure

H04B 1/7093 .... Matched filter type

H04B 2001/70935 ..... {using a bank of matched fileters, e.g. Fast Hadamard Transform}

H04B 1/7095 .... Sliding correlator type

H04B 1/7097 ... Interference-related aspects

H04B 1/71 .... the interference being narrowband interference

H04B 1/7101 ..... {with estimation filters}

H04B 1/7102 ..... {with transform to frequency domain}

H04B 1/7103 .... the interference being multiple access interference



|                 |       |  |
|-----------------|-------|--|
| H04B 1/7105     | ..... | Joint detection techniques, e.g. linear detectors  |
| H04B 1/71052    | ..... | {using decorrelation matrix}   |
| H04B 1/71055    | ..... | {using minimum mean squared error [MMSE] detector}   |
| H04B 1/71057    | ..... | {using maximum-likelihood sequence estimation [MLSE]}  |
| H04B 1/7107     | ..... | Subtractive interference cancellation  |
| H04B 1/71072    | ..... | {Successive interference cancellation}   |
| H04B 1/71075    | ..... | {Parallel interference cancellation}   |
| H04B 2001/71077 | ..... | {Partial interference cancellation}  |
| H04B 1/711      | ....  | the interference being multi-path interference   |
| H04B 1/7113     | ..... | Determination of path profile  |
| H04B 1/7115     | ..... | Constructive combining of multi-path signals, i.e. RAKE receivers  |
| H04B 1/7117     | ..... | Selection, re-selection, allocation or re-allocation of paths to fingers, e.g. timing offset control of allocated fingers            |
| H04B 1/712      | ..... | Weighting of fingers for combining, e.g. amplitude control or phase rotation using an inner loop                                     |
| H04B 1/713      | ..    | using frequency hopping  |
| H04B 1/7136     | ...   | Arrangements for generation of hop frequencies, e.g. using a bank of frequency sources, using continuous tuning or using a transform |
| H04B 2001/71362 | ....  | {using a bank of frequency sources}  |
| H04B 2001/71365 | ....  | {using continuous tuning of a single frequency source}   |
| H04B 2001/71367 | ....  | {using a transform}  |
| H04B 1/7143     | ...   | Arrangements for generation of hop patterns  |
| H04B 1/715      | ...   | Interference-related aspects   |
| H04B 2001/7152  | ....  | {with means for suppressing interference}  |
| H04B 2001/7154  | ....  | {with means for preventing interference}   |
| H04B 1/7156     | ...   | Arrangements for sequence synchronisation  |
| H04B 2001/71563 | ....  | {Acquisition}  |
| H04B 2001/71566 | ....  | {Tracking}   |
| H04B 1/7163     | ..    | 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 ( <a href="#">H04B 1/7172</a> and <a href="#">H04B 1/7176</a> take precedence)} |
| H04B 1/71635 | ... | {Transmitter aspects ( <a href="#">H04B 1/7174</a> takes precedence)}                           |
| H04B 1/71637 | ... | {Receiver aspects ( <a href="#">H04B 1/7183</a> takes precedence)}                              |
| H04B 1/717   | ... | Pulse-related aspects   |

**WARNING**



H04B 1/717

(continued)

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

H04B 3/141

.... {[using multiequalisers, e.g. bump, cosine, Bode](#)}

H04B 3/142

.... {[using echo-equalisers, e.g. transversal](#)}

H04B 3/143

.... {[using amplitude-frequency equalisers](#)}

H04B 3/144

..... {[fixed equalizers](#)}

H04B 3/145

..... {[variable equalisers](#)}

H04B 3/146

.... {[using phase-frequency equalisers](#)}

H04B 3/147

..... {[fixed equalisers](#)}

H04B 3/148

..... {[variable equalisers](#)}

- H04B 3/16 . . . characterised by the negative-impedance network used
- H04B 3/18 . . . . wherein the network comprises semiconductor devices
- H04B 3/20 . . Reducing echo effects or singing; Opening or closing transmitting path; Conditioning for transmission in one direction or the other
- H04B 3/21 . . . using a set of bandfilters
- H04B 3/23 . . . using a replica of transmitted signal in the time domain, e.g. echo cancellers
- H04B 3/231 . . . . {Echo cancellers using readout of a memory to provide the echo replica}
- H04B 3/232 . . . . {using phase shift, phase roll or frequency offset correction}
- H04B 3/234 . . . . {using double talk detection}
- H04B 3/235 . . . . {combined with adaptive equaliser}
- H04B 3/237 . . . . {using two adaptive filters, e.g. for near end and for end echo cancelling}
- H04B 3/238 . . . . {using initial training sequence}
- H04B 3/26 . . Improving frequency characteristic by the use of loading coils ([loading coils per se H01F 17/08](#))
- H04B 3/28 . . Reducing interference caused by currents induced in cable sheating or armouring
- H04B 3/30 . . Reducing interference caused by unbalance current in a normally balanced line
- H04B 3/32 . . Reducing cross-talk, e.g. by compensating
- H04B 3/34 . . . by systematic interconnection of lengths of cable during laying; by addition of balancing components to cable during laying
- H04B 3/36 . . Repeater circuits ([H04B 3/58 takes precedence](#); [amplifiers therefor H03F](#))
- H04B 3/38 . . . for signals in two different frequency ranges transmitted in opposite directions over the same transmission path
- H04B 3/40 . . Artificial lines; Networks simulating a line of certain length
- H04B 3/42 . . Circuits for by-passing of ringing signals
- H04B 3/44 . . Arrangements for feeding power to a repeater along the transmission line
- H04B 3/46 . . Monitoring; Testing
- H04B 3/462 . . . Testing group delay or phase shift, e.g. timing jitter
- H04B 3/466 . . . . Testing attenuation in combination with at least one of group delay and phase shift
- H04B 3/48 . . . Testing attenuation ([H04B 3/466 takes precedence](#))
- H04B 3/487 . . . Testing crosstalk effects
- H04B 3/493 . . . Testing echo effects or singing
- H04B 3/50 . Systems for transmission between fixed stations via two-conductor transmission lines ([H04B 3/54 takes precedence](#))
- H04B 3/52 . 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 H04L 12/10](#); [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)**

- H04B 7/002 . {Reducing depolarization effects}
- H04B 7/005 . Control of transmission; Equalising
- H04B 7/01 . Reducing phase shift
- H04B 7/015 . Reducing echo effects
- H04B 7/02 . Diversity systems ([for direction finding G01S 3/72](#); [aerial arrays or systems H01Q](#); [reducing multipath interference in spread spectrum systems H04B 1/7115](#); [specially adapted for satellite systems H04B 7/18534](#); for telegraphy or data transmission [H04L 1/02](#))
  - H04B 7/022 . . {Site diversity, e.g. macro-diversity ([for co-located independent aerials H04B 7/04](#))}
  - H04B 7/024 . . . {Cooperative use of antennas of several nodes, e.g. in coordinated multipoint or cooperative MIMO [Multiple Input Multiple Output]}
  - H04B 7/026 . . . {Cooperative diversity, e.g. using fixed or mobile stations as relays ([cooperative coding H04L 1/0077](#), [relays per se in CoMP H04B 7/15592](#))}
  - H04B 7/028 . . {Spatial transmit diversity using a single antenna at the transmitter}

|             |     |  |
|-------------|-----|--|
| H04B 7/04   | ..  | using a plurality of spaced independent aerials                                      |
| H04B 7/0404 | ... | {the mobile station comprising multiple antennas (e.g. aspects of uplink diversity)} |
| H04B 7/0408 | ... | {using a plurality of beams, e.g. beam diversity}                                    |
| H04B 7/0413 | ... | {Multiple input multiple output [MIMO] systems}                                      |

**WARNING**

Group [H04B 7/0413](#) and subgroups are not complete pending reorganisation. See also [H04W 52/42](#)

|             |       |  |
|-------------|-------|--|
| H04B 7/0417 | ....  | {Feedback systems}   |
| H04B 7/0421 | ..... | {utilizing implicit feedback, e.g. steered pilot signals}  |
| H04B 7/0426 | ....  | {Power distribution aspects}   |
| H04B 7/043  | ..... | {using best eigenmode, e.g. beam forming or beam steering}   |
| H04B 7/0434 | ..... | {using multiple eigenmodes}  |
| H04B 7/0439 | ..... | {utilizing channel inversion}  |
| H04B 7/0443 | ..... | {utilizing "waterfilling" technique}   |
| H04B 7/0447 | ..... | {utilizing uniform distribution}   |
| H04B 7/0452 | ....  | {Multiple user MIMO systems}   |
| H04B 7/0456 | ....  | {Selection of precoding matrix or codebook, e.g. using matrices for antenna weighting ( <a href="#">codebook-based design for spatial equalizers at the transmitter H04L 25/03898</a> )} |
| H04B 7/046  | ..... | {taking physical layer constraints into account}   |
| H04B 7/0465 | ..... | {taking power constraints at power amplifier or emission constraints, e.g. constant modulus, into account}   |
| H04B 7/0469 | ..... | {taking special antenna structures, e.g. cross polarized antennas into account}  |
| H04B 7/0473 | ..... | {taking constraints in layer or codeword to antenna mapping into account}  |
| 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 ( <a href="#">H04B 7/0686</a> takes precedence; antenna beam directivity switching <a href="#">H01Q 3/24</a> )}   |
| 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 7/061  | ..... | {using feedback from receiving side}   |
| H04B 7/0613 | ....  | {using simultaneous transmission ( <a href="#">H04B 7/0686</a> 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 <a href="#">H04L 1/0001</a> )}   |
| 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 <a href="#">H04B 7/0623</a> - <a href="#">H04B 7/0634</a> , 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]}                           |
| H04B 7/0663 | ..... | {using vector or matrix manipulations}  |
| H04B 7/0665 | ..... | {Feed forward of transmit weights to the receiver}  |
| H04B 7/0667 | ..... | {of delayed versions of same signal (using space-time coding <a href="#">H04L 1/0618</a> )}   |
| H04B 7/0669 | ..... | {using different channel coding between antennas (space-time coding <a href="#">H04L 1/0618</a> )}  |
| H04B 7/0671 | ..... | {using different delays between antennas}   |
| H04B 7/0673 | ..... | {using feedback from receiving side}  |
| H04B 7/0676 | ..... | {using random or pseudo-random delays}  |
| H04B 7/0678 | ..... | {using different spreading codes between antennas (code allocation <a href="#">H04J 13/16</a> )}  |
| H04B 7/068  | ..... | {using space frequency diversity (space-frequency coding <a href="#">H04L 1/0606</a> )}   |

|             |       |  |
|-------------|-------|--|
| H04B 7/0682 | ..... | {using phase diversity (e.g. phase sweeping)}  |
| H04B 7/0684 | ..... | {using different training sequences per antenna}   |
| H04B 7/0686 | ....  | {Hybrid systems, i.e. switching and simultaneous transmission}   |
| H04B 7/0689 | ..... | {using different transmission schemes, at least one of them being a diversity transmission scheme}   |
| H04B 7/0691 | ..... | {using subgroups of transmit antennas}   |
| H04B 7/0693 | ..... | {switching off a diversity branch, e.g. to save power}   |
| H04B 7/0695 | ..... | {using beam selection}   |
| H04B 7/0697 | ....  | {using spatial multiplexing}   |
| H04B 7/08   | ...   | at receiving station, e.g. space diversity   |
| H04B 7/0802 | ....  | {using antenna selection ( <a href="#">H04B 7/0868</a> takes precedence; antenna beam directivity switching <a href="#">H01Q 3/24</a> )}                       |
| H04B 7/0805 | ..... | {with single receiver and antenna switching ( <a href="#">H04B 7/0822</a> takes precedence)}   |
| H04B 7/0808 | ..... | {comparing all antennas before reception}  |
| H04B 7/0811 | ..... | {during preamble or gap period}  |
| H04B 7/0814 | ..... | {based on current reception conditions, e.g. switching to different antenna when signal level is below threshold}  |
| H04B 7/0817 | ..... | {with multiple receivers and antenna path selection}   |
| H04B 7/082  | ..... | {selecting best antenna path}  |
| H04B 7/0822 | ..... | {according to predefined selection scheme}   |
| H04B 7/0825 | ..... | {with main and with auxiliary or diversity antennas}   |
| H04B 7/0828 | ..... | {with delay elements in antenna paths}   |
| H04B 7/0831 | ..... | {Compensation of the diversity switching process for non-uniform properties or faulty operations of the switches used in the diversity switching process}      |
| H04B 7/0834 | ..... | {based on external parameters, e.g. subscriber speed or location}  |
| H04B 7/0837 | ....  | {using pre-detection combining ( <a href="#">H04B 7/0868</a> takes precedence)}  |
| H04B 7/084  | ..... | {Equal gain combining, only phase adjustments (antenna beam scanning or forming by phase or amplitude control <a href="#">H01Q 3/26</a> , e.g. phased arrays)} |
| H04B 7/0842 | ..... | {Weighted combining}   |
| H04B 7/0845 | ..... | {per branch equalization, e.g. by an FIR-filter or RAKE receiver per antenna branch (rake receivers as such <a href="#">H04B 1/7115</a> )}                     |
| H04B 7/0848 | ..... | {Joint weighting}  |
| H04B 7/0851 | ..... | {using training sequences or error signal ( <a href="#">minimizing error signal H04B 7/0854</a> )}   |
| H04B 7/0854 | ..... | {using error minimizing algorithms, e.g. minimum mean squared error [MMSE], "cross-correlation" or matrix inversion}   |
| H04B 7/0857 | ..... | {using maximum ratio combining techniques, e.g. signal-to-interference ratio [SIR], received signal strength indication [RSS]}                                 |
| H04B 7/086  | ..... | {using weights depending on external parameters, e.g. direction of arrival [DOA], predetermined weights or beamforming}  |
| H04B 7/0862 | ..... | {receiver computing weights based on information from the transmitter}   |

|              |       |   |
|--------------|-------|---|
| H04B 7/0865  | ..... | {Independent weighting, i.e. weights based on own antenna reception parameters}   |
| H04B 7/0868  | ....  | {Hybrid systems, i.e. switching and combining}  |
| H04B 7/0871  | ..... | {using different reception schemes, at least one of them being a diversity reception scheme}  |
| H04B 7/0874  | ..... | {using subgroups of receive antennas}   |
| H04B 7/0877  | ..... | {switching off a diversity branch, e.g. to save power}  |
| H04B 7/088   | ..... | {using beam selection}  |
| H04B 7/0882  | ....  | {using post-detection diversity}  |
| H04B 7/0885  | ..... | {with combination}  |
| H04B 7/0888  | ..... | {with selection}  |
| H04B 7/0891  | ....  | {Space-time diversity (rake receivers <a href="#">H04B 1/7115</a> ; space-time decoding <a href="#">H04L 1/0631</a> )}  |
| H04B 7/0894  | ..... | {using different delays between antennas}   |
| H04B 7/0897  | ..... | {using beamforming per multi-path, e.g. to cope with different directions of arrival [DOA] at different multi-paths}  |
| H04B 7/10    | ..    | using a single aerial system characterised by its polarisation or directive properties, e.g. polarisation diversity, direction diversity  |
| H04B 7/12    | ..    | Frequency-diversity systems   |
| H04B 7/14    | .     | Relay systems (interrogator-responder radar systems <a href="#">G01S 13/74</a> ; {CATV [community antenna television] systems <a href="#">H04H 20/78</a> ; adapted for television <a href="#">H04N 7/20</a> )   |
| H04B 7/145   | ..    | Passive relay systems {(construction of passive reflectors <a href="#">G01S 13/02</a> )}  |
| H04B 7/15    | ..    | Active relay systems  |
| H04B 7/155   | ...   | Ground-based stations ( <a href="#">H04B 7/204</a> takes precedence; {for satellite systems <a href="#">H04B 7/18517</a> )}   |
| H04B 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 <a href="#">H04W 16/26</a> ; network topologies using dedicated repeater stations <a href="#">H04W 84/047</a> ; terminal devices adapted for relaying to or from an other terminal <a href="#">H04W 88/04</a> )}  |
| H04B 7/15514 | ..... | {for shadowing compensation (for satellite mobile telephony service systems <a href="#">H04B 7/18536</a> )}   |
| H04B 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 <a href="#">H04L 1/0076</a> ; network traffic management with optimizing of information sizing, e.g. header compression, by using assembly and disassembly of packets <a href="#">H04W 28/065</a> )} |
| 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 <a href="#">H03G 3/00</a> ; gain control reducing self - or loop interference <a href="#">H04B 7/15578</a> )}   |



|              |       |  |
|--------------|-------|--|
| H04B 7/15542 | ..... | {Selecting at relay station its transmit and receive resources (selection of wireless resources by user or terminal <a href="#">H04W 72/02</a> ; arrangements affording multiple use of the transmission path by two-dimensional division of the resources <a href="#">H04L 5/0003</a> , or by allocating sub-channels <a href="#">H04L 5/003</a> )} |
| 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 ( <a href="#">cooperative diversity H04B 7/024</a> )}  |
| 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} ( <a href="#">H04B 7/204 takes precedence</a> )   |
| 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 ( <a href="#">H04B 7/18508</a> , <a href="#">H04B 7/18521 take precedence</a> ; providing specific services <a href="#">H04B 7/18523 to H04B 7/18576</a> )}  |
| 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 ( <a href="#">for optical links between satellites H04B 10/118</a> )}  |
| H04B 7/18523 | ....  | {Satellite systems for providing broadcast service to terrestrial stations, i.e. broadcast satellite service ( <a href="#">arrangements specially adapted for satellite broadcast receiving H04H 40/90</a> ; picture transmission via satellite <a href="#">H04N 1/00103</a> ; television transmission via satellite <a href="#">H04N 7/20</a> )}    |
| H04B 7/18526 | ..... | {Arrangements for data linking, networking or transporting, or for controlling an end to end session ( <a href="#">data switching networks H04L 12/00</a> )}   |
| 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 ( <a href="#">for selecting H04W</a> )}  |

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|--------------|-------|---|
| 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 <a href="#">H04L 1/00</a> )}                                     |
| 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 <a href="#">G01S 5/00</a> )}  |
| 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 <a href="#">G01S 5/14</a> )}              |
| 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 <a href="#">H04L 12/00</a> )}   |
| H04B 7/18565 | ..... | {Arrangements for preventing unauthorised access or for providing user protection (arrangements for secret or secure communication <a href="#">H04L 9/00</a> )}                                 |
| 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 <a href="#">H04W</a> )}                       |
| H04B 7/18578 | ....  | {Satellite systems for providing broadband data service to individual earth stations (for selecting <a href="#">H04W</a> ; provisions for broadband connection, <a href="#">H04Q 11/0478</a> )} |
| H04B 7/1858  | ..... | {Arrangements for data transmission on the physical system, i.e. for data bit transmission between network components}  |
| H04B 7/18582 | ..... | {Arrangements for data linking, i.e. for data framing, for error recovery, for multiple access}   |
| H04B 7/18584 | ..... | {Arrangements for data networking, i.e. for data packet routing, for congestion control (data switching networks <a href="#">H04L 12/00</a> )}  |

|              |       |  |
|--------------|-------|--|
| H04B 7/18586 | ..... | {Arrangements for data transporting, e.g. for an end to end data transport or check}   |
| H04B 7/18589 | ..... | {Arrangements for controlling an end to end session, i.e. for initialising, synchronising or terminating an end to end link}   |
| H04B 7/18591 | ..... | {Arrangements for interconnecting multiple systems (data switching networks <a href="#">H04L 12/00</a> )}  |
| H04B 7/18593 | ..... | {Arrangements for preventing unauthorised access or for providing user protection (arrangements for secret or secure communication <a href="#">H04L 9/00</a> )}  |
| H04B 7/18595 | ..... | {Arrangements for adapting broadband applications to satellite systems}  |
| H04B 7/18597 | ..... | {Arrangements for system physical machines management, i.e. for construction, operations control, administration, maintenance}   |
| H04B 7/19    | ....  | Earth-synchronous stations   |
| H04B 7/195   | ....  | Non-synchronous stations   |
| H04B 7/204   | ...   | Multiple access  |
| H04B 7/2041  | ....  | {Spot beam multiple access}  |
| H04B 7/2043  | ....  | {Mixed mode, TDM and FDM systems}  |
| H04B 7/2045  | ....  | {SS-FDMA, FDMA satellite switching}  |
| H04B 7/2046  | ....  | {SS-TDMA, TDMA satellite switching}  |
| H04B 7/2048  | ..... | {Frame structure, synchronisation or frame acquisition in SS-TDMA systems}   |
| H04B 7/208   | ....  | Frequency-division multiple access {[FDMA]}  |
| H04B 7/212   | ....  | Time-division multiple access {[TDMA]}   |
| H04B 7/2121  | ..... | {Channels assignment to the different stations}  |
| H04B 7/2123  | ..... | {Variable assignment, e.g. demand assignment}  |
| H04B 7/2125  | ..... | {Synchronisation}  |
| H04B 7/2126  | ..... | {using a reference station}  |
| H04B 7/2128  | ..... | {Changing of the reference station}  |
| H04B 7/216   | ....  | Code division or spread-spectrum multiple access ({CDMA, SSMA} ; spread spectrum techniques in general <a href="#">H04B 1/69</a> )   |
| H04B 7/22    | .     | Scatter propagation systems, {e.g. ionospheric, tropospheric or meteor scatter}  |
| H04B 7/24    | .     | for communication between two or more posts (for selecting <a href="#">H04W</a> ; {wireless communication networks <a href="#">H04W</a> })   |
| H04B 7/26    | ..    | at least one of which is mobile  |
| H04B 7/2603  | ...   | {Arrangements for wireless physical layer control ( <a href="#">H04B 7/2612</a> takes precedence)}   |
| H04B 7/2606  | ....  | {Arrangements for base station coverage control, e.g. by using relays in tunnels}  |
| H04B 7/2609  | ....  | {Arrangements for range control, e.g. by using remote antennas}  |
| H04B 7/2612  | ...   | {Arrangements for wireless medium access control, e.g. by allocating physical layer transmission capacity ( <a href="#">H04B 7/2615</a> to <a href="#">H04B 7/2643</a> take precedence; provision for broadband connection <a href="#">H04Q 11/0478</a> )} |
| 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] ( <a href="#">H04B 7/2615</a> takes precedence)}  |
| H04B 7/2625 | ...   | {using common wave}  |
| H04B 7/2628 | ...   | {using code-division multiple access [CDMA] or spread spectrum multiple access [SSMA] ( <a href="#">H04B 7/2618</a> 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] ( <a href="#">H04B 7/2615</a> , <a href="#">H04B 7/2618</a> 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 <a href="#">H04B 1/7075</a> , for code tracking <a href="#">H04B 1/7085</a> } |
| 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 ( <a href="#">H04B 7/2693</a> takes precedence)}   |

**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**

## H04B 10/00

(continued)

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

- H04B 10/112 .. Line-of-sight transmission over an extended range
- H04B 10/1121 ... {One-way transmission}
- H04B 10/1123 ... {Bidirectional transmission}
- H04B 10/1125 .... {using a single common optical path}
- H04B 10/1127 .... {using two distinct parallel optical paths}
- H04B 10/1129 ... {Arrangements for outdoor wireless networking of information}
- H04B 10/114 .. Indoor or close-range type systems
- H04B 10/1141 ... {One-way transmission}
- H04B 10/1143 ... {Bidirectional transmission}
- H04B 10/1149 ... {Arrangements for indoor wireless networking of information}
- H04B 10/116 ... Visible light communication

**WARNING**

This group is not complete pending reclassification; see also [H04B 10/114](#) and its other subgroups

- H04B 10/118 .. specially adapted for satellite communication
- H04B 10/12 . {Transmission through light guides, e.g. optical fibres ([H04B 10/25](#) takes precedence)}

**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](#)

- H04B 10/14 .. Terminal stations

**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](#)

- H04B 10/142 ... Coherent homodyne or heterodyne systems
- H04B 10/152 ... Non-coherent direct-detection systems
- H04B 10/22 . Transmission between two stations which are mobile relative to each other

**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](#)

- H04B 10/225 .. {using optical fibre links}

- H04B 10/25 . Arrangements specific to fibre transmission {(optical fibres per se, structural details of arrangements comprising optical fibres or other optical elements [G02B 6/00](#))}

### **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}   |
| H04B 10/2581  | ..    | Multimode transmission {(mode multiplex systems <a href="#">H04J 14/04</a> )}  |
| H04B 10/2587  | ..    | using a single light source for multiple stations  |
| H04B 10/27    | .     | Arrangements for networking {(free-space networks <a href="#">H04B 10/11</a> , WDM networks <a href="#">H04J 14/0278</a> , specific to radio-over-fibre <a href="#">H04B 10/25753</a> )} |
| H04B 10/271   | ..    | {Combination of different networks, e.g. star and ring configuration in the same network or two ring networks interconnected}  |
| H04B 10/272   | ..    | Star-type networks {or tree-type networks}   |
| H04B 10/2725  | ...   | {Star-type networks without a headend}   |
| H04B 10/275   | ..    | Ring-type networks   |
| H04B 10/2755  | ...   | {Ring-type networks with a headend}  |
| H04B 10/278   | ..    | Bus-type networks  |
| H04B 10/29    | .     | Repeaters  |
| H04B 10/291   | ..    | in which processing or amplification is carried out without conversion of the main signal from optical form {(fibre optical amplifiers per se <a href="#">H01S 3/067</a> )}              |
| H04B 10/2912  | ...   | {characterised by the medium used for amplification or processing}   |
| H04B 10/2914  | ....  | {using lumped semiconductor optical amplifiers [SOA] (semiconductor optical amplifiers per se <a href="#">H01S 5/50</a> )}   |
| H04B 10/2916  | ....  | {using Raman or Brillouin amplifiers (Raman or Brillouin amplifiers per se <a href="#">H01S 3/302</a> )}   |
| H04B 10/2918  | ...   | {Two-way repeaters, i.e. repeaters amplifying separate upward and downward lines}  |
| H04B 10/293   | ...   | Signal power control   |
| H04B 10/2931  | ....  | {using AGC ( <a href="#">H04B 10/294</a> takes precedence)}  |
| H04B 10/2933  | ....  | {considering the whole optical path}   |
| H04B 10/2935  | ..... | {with a cascade of amplifiers}   |
| H04B 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}                            |
| H04B 10/2939  | ..... | {Network aspects}  |
| H04B 10/294   | ....  | in a multiwavelength system, e.g. gain equalisation {(for general power control in WDM systems, see also <a href="#">H04J 14/0221</a> )}   |
| H04B 10/2941  | ..... | {using an equalising unit, e.g. a filter ( <a href="#">H04B 10/296</a> takes precedence)}  |
| H04B 10/2942  | ..... | {using automatic gain control [AGC] ( <a href="#">H04B 10/296</a> takes precedence)}   |
| H04B 10/296   | ..... | Transient power control, e.g. due to channel add/drop or rapid fluctuations in the input power   |
| H04B 10/297   | ...   | Bidirectional amplification  |
| H04B 10/2971  | ....  | {A single amplifier for both directions}   |
| H04B 10/2972  | ....  | {Each direction being amplified separately}  |
| H04B 10/299   | ...   | Signal waveform processing, e.g. reshaping or retiming   |

- H04B 10/30 . 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 <a href="#">H04B 10/677</a> )}  |
| 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 [PolMux] X-PSK coherent receivers, polarization diversity heterodyne coherent receivers ( <a href="#">H04J 14/06 takes precedence</a> )}                 |
| H04B 10/615  | ...   | {Arrangements affecting the optical part of the receiver (adjustment of the frequency or phase of the local oscillator in homodyne receivers <a href="#">H04B 10/63</a> , use of polarization beam splitters <a href="#">H04B 10/614</a> )} |
| 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 ( <a href="#">polarisation multiplex systems H04J 14/06</a> )}  |
| 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 [fIF] 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**

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 <a href="#">H04B 10/03</a> - <a href="#">H04B 10/70</a> , 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 <a href="#">H04B 3/44</a> )}  |
| 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](#)

|                   |  |
|-------------------|--|
| <b>H04B 11/00</b> | <b>Transmission systems employing sonic, ultrasonic or infrasonic waves</b>  |
| <b>H04B 13/00</b> | <b>Transmission systems characterised by the medium used for transmission, not provided for in groups <a href="#">H04B 3/00</a> to <a href="#">H04B 11/00</a></b>  |
| 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 <a href="#">H04B 3/00</a> ; {geophysics, detecting hidden masses <a href="#">G01H</a> , <a href="#">G01V 1/16</a> , <a href="#">G01V 1/18</a> , <a href="#">G01V 3/00</a> ; sonars <a href="#">G01S 1/72</a> ; applications of earth currents <a href="#">G01S 1/72</a> , <a href="#">H05F 7/00</a> ; direction and distance determination with lead cables <a href="#">G01S 13/00</a> )} |
| <b>H04B 14/00</b> | <b>Transmission systems not characterised by the medium used for transmission (details thereof <a href="#">H04B 1/00</a>)</b>  |
| H04B 14/002       | . {characterised by the use of a carrier modulation (using subcarrier modulation <a href="#">H04B 14/08</a> )}   |
| 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 <a href="#">H04B 7/17</a> ; transmission of digital information per se <a href="#">H04L</a> )   |
| 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 <a href="#">H03M 1/00</a> ; {for TV signals <a href="#">H04N 7/24</a> })  |
| H04B 14/042       | ... {Special circuits, e.g. comparators}   |
| H04B 14/044       | ... {Sample and hold circuits (in general <a href="#">G11C 27/02</a> )}  |
| 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 <a href="#">H03M 3/00</a> )  |
| 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  |
| <b>H04B 15/00</b> | <b>Suppression or limitation of noise or interference (by means associated with receiver <a href="#">H04B 1/10</a>)</b>  |
| 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 <a href="#">H02K 11/00</a> )   |
| H04B 15/025       | .. {Reducing interference from ignition apparatus of fuel engines (cables with high resistance <a href="#">H01B</a> )}   |

- 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** (of line transmission systems [H04B 3/46](#); arrangements for monitoring or testing transmission systems employing electromagnetic waves other than radio waves [H04B 10/07](#))
  - H04B 17/0082 . {using service channels; using auxiliary channels}
  - H04B 17/0085 . . {using test signal generators}
  - H04B 17/0087 . . {using auxiliary channels or channel simulators}
  - H04B 17/10 . of transmitters
    - H04B 17/101 . . {for measurement of parameters}
      - H04B 17/102 . . . {of radiated power at antenna port}
      - H04B 17/103 . . . {of reflected power, e.g. return loss}
      - H04B 17/104 . . . {of other parameters, e.g. DC offset, delay or propagation times}
    - H04B 17/11 . . for calibration
      - H04B 17/12 . . . of transmit antennas, e.g. of the amplitude or phase
      - H04B 17/13 . . . of power amplifiers, e.g. gain or non-linearity
      - H04B 17/14 . . . of the whole transmission and reception path, e.g. self-test loop-back
    - H04B 17/15 . . Performance testing
      - H04B 17/16 . . . Test equipment located at the transmitter
      - H04B 17/17 . . . Detection of non-compliance or faulty performance, e.g. response deviations ([H04B 17/18 takes precedence](#))
      - H04B 17/18 . . . Monitoring during normal operation
      - H04B 17/19 . . . Self-testing arrangements
  - H04B 17/20 . of receivers
    - H04B 17/21 . . for calibration; for correcting measurements
    - H04B 17/23 . . Indication means, e.g. displays, alarms, audible means
    - H04B 17/24 . . with feedback of measurements to the transmitter
    - H04B 17/26 . . using historical data, averaging values or statistics
    - H04B 17/27 . . for locating or positioning the transmitter
    - H04B 17/29 . . Performance testing
  - H04B 17/30 . of propagation channels
    - H04B 17/309 . . Measuring or estimating channel quality parameters
      - H04B 17/318 . . . Received signal strength
        - H04B 17/327 . . . . Received signal code power [RSCP]
        - H04B 17/336 . . . Signal-to-interference ratio [SIR] or carrier-to-interference ratio [CIR]
        - H04B 17/345 . . . Interference values ([H04B 17/336 takes precedence](#))
        - H04B 17/354 . . . Adjacent channel leakage power
        - H04B 17/364 . . . Delay profiles
      - H04B 17/373 . . Predicting channel quality parameters

|              |      |  |
|--------------|------|--|
| H04B 17/382  | ..   | for resource allocation, admission control or handover   |
| H04B 17/391  | ..   | Modelling the propagation channel                        |
| H04B 17/3911 | ...  | {Fading models or fading generators}                     |
| H04B 17/3912 | ...  | {Simulation models}                                      |
| H04B 17/3913 | ...  | {Predictive models}                                      |
| H04B 17/40   | .    | of relay systems   |
| H04B 17/401  | ..   | {with selective localization}                            |
| H04B 17/402  | ...  | {using different frequencies}                            |
| H04B 17/403  | .... | {generated by local oscillators}                         |
| H04B 17/404  | .... | {selected by local filters}                              |
| H04B 17/405  | .... | {generated by local multipliers, dividers, modulators}   |
| H04B 17/406  | ...  | {using coded addresses}                                  |
| H04B 17/407  | ..   | {without selective localization}                         |
| H04B 17/408  | ...  | {using successive loop-backs}                            |
| H04B 17/409  | ...  | {by means of resistance, voltage or current measurement} |

**H04B 2201/00**      **Indexing scheme relating to details of transmission systems not covered by a single group of [H04B 3/00](#) to [H04B 13/00](#)**

|                 |       |  |
|-----------------|-------|--|
| H04B 2201/69    | .     | Orthogonal indexing scheme relating to spread spectrum techniques in general |
| H04B 2201/692   | ..    | Cognitive radio  |
| H04B 2201/694   | ..    | WPAN   |
| H04B 2201/696   | ..    | relating to Downlink   |
| H04B 2201/698   | ..    | relating to Uplink   |
| H04B 2201/707   | ..    | relating to direct sequence modulation                                       |
| H04B 2201/70701 | ...   | featuring pilot assisted reception   |
| H04B 2201/70702 | ...   | Intercell-related aspects  |
| H04B 2201/70703 | ...   | using multiple or variable rates   |
| H04B 2201/70705 | ....  | Rate detection   |
| H04B 2201/70706 | ...   | with means for reducing the peak-to-average power ratio                      |
| H04B 2201/70707 | ...   | Efficiency-related aspects   |
| H04B 2201/70709 | ....  | with discontinuous detection   |
| H04B 2201/7071  | ....  | with dynamic control of receiver resources                                   |
| H04B 2201/70711 | ..... | with modular structure   |
| H04B 2201/70713 | ....  | Reducing computational requirements  |
| H04B 2201/70714 | ....  | Reducing hardware requirements   |
| H04B 2201/70715 | ...   | with application-specific features   |
| H04B 2201/70716 | ...   | Quadrature   |
| H04B 2201/70718 | ...   | Particular systems or standards  |
| H04B 2201/70719 | ....  | CDMA2000   |
| H04B 2201/7072  | ....  | HDR  |
| H04B 2201/70722 | ....  | HSDPA/HSUPA  |



|                     |       |  |
|---------------------|-------|--|
| H04B 2201/70723     | ..... | Multi-carrier HSPA   |
| H04B 2201/70724     | ....  | UMTS   |
| H04B 2201/70726     | ....  | Asynchronous CDMA  |
| H04B 2201/70727     | ...   | using fast Fourier transform   |
| H04B 2201/70728     | ...   | Frequency aspects  |
| H04B 2201/7073      | ...   | Direct sequence modulation synchronisation   |
| H04B 2201/70733     | ....  | 2D search  |
| H04B 2201/70736     | ....  | DSA  |
| H04B 2201/7097      | ...   | Direct sequence modulation interference  |
| H04B 2201/709709    | ....  | Methods of preventing interference   |
| H04B 2201/709718    | ....  | Determine interference   |
| H04B 2201/709727    | ....  | GRAKE type RAKE receivers  |
| H04B 2201/709736    | ....  | Hybrid interference mitigation schemes   |
| H04B 2201/709745    | ....  | Iterative interference mitigation schemes  |
| H04B 2201/709754    | ....  | Blind joint detection  |
| H04B 2201/709763    | ....  | Joint detection using feedback   |
| H04B 2201/709772    | ....  | Joint detection using feedforward  |
| H04B 2201/709781    | ....  | Linear detectors for joint detection   |
| H04B 2201/70979     | ....  | Fat finger issues in RAKE receivers  |
| H04B 2201/713       | ..    | Frequency hopping  |
| H04B 2201/71307     | ...   | Partial band interference  |
| H04B 2201/71315     | ...   | Wide band interference   |
| H04B 2201/71323     | ...   | Adaptive systems   |
| H04B 2201/7133      | ...   | Asymmetric systems   |
| H04B 2201/71338     | ...   | Asynchronous systems   |
| H04B 2201/71346     | ...   | Bluetooth  |
| H04B 2201/71353     | ...   | Fast frequency hopping   |
| H04B 2201/71361     | ...   | Slow frequency hopping   |
| H04B 2201/71369     | ...   | OFCHM  |
| H04B 2201/71376     | ...   | Threshold  |
| H04B 2201/71384     | ...   | Look-up tables   |
| H04B 2201/71392     | ...   | Asymmetric systems   |
| H04B 2201/7163      | ..    | Orthogonal indexing scheme relating to impulse radio   |
| H04B 2201/71632     | ...   | Diversity  |
| H04B 2201/71634     | ...   | Applied to ranging   |
| H04B 2201/71636     | ...   | Transmitted reference  |
| H04B 2201/71638     | ...   | Spectrum issues  |
| <b>H04B 2203/00</b> |       | <b>Indexing scheme relating to line transmission systems</b>   |
| H04B 2203/54        | .     | Aspects of powerline communications not already covered by <a href="#">H04B 3/54</a> and its subgroups ( <i>not used</i> ) |

- 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

**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