H04B

TRANSMISSION

Definition statement

This place covers:
The transmission of information carrying signals, the transmission being independent of the nature of
the information. Monitoring and testing arrangements and the suppression and limitation of noise and
interference.

The user is referred to the IPC definitions of individual main groups of subclass H04B:

Transmission systems characterised by the waveband used for transmission:

Radio waves - see definition for main group H04B 7/00.

Light, infrared waves or corpuscular radiation - see definition for main group H04B 10/00.

Ultrasonic, sonic or infrasonic waves - see definition for main group H04B 11/00.

Transmission systems characterised by the medium used for transmission:

Conductors - see definition for main group H04B 3/00.

Free-space propagation - see definition for main groups H04B 5/00, H04B 7/00, H04B 10/00,

Earth, water or body - see definition for main group H04B 13/00.

Transmission systems characterised by the carrier modulation used for transmission:

Pulse modulation - see definition for main group H04B 14/00.

Relationships with other classification places

If the transmission systems are specially adapted for particular applications classification is also made
in subclasses listed in section "Informative references".

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| Transmission systems for measured values, control or similar signals | G08C |
| Speech analysis or synthesis | G10L |
| Coding, decoding or code conversion | H03M |
| Broadcast communication | H04H |
| Multiplex communication | H04J |
| Secret communication | H04K |
| Transmission of digital information | H04L |
| Telephonic communication | H04M |
| Pictorial communication | H04N |
| Wireless communication networks | H04W |
Special rules of classification

Transmission systems characterised by the medium used for transmission or by band of employing waves should be classified in groups H04B 3/00- H04B 11/00 or in residual group H04B 13/00.

Transmission systems characterised by the use of carrier modulation or sub-carrier should be classified in group H04B 14/00 and details thereof in group H04B 1/00.

H04B 1/00

Details of transmission systems, not covered by a single one of groups H04B 3/00 - H04B 13/00; Details of transmission systems not characterised by the medium used for transmission

Definition statement

This place covers:
Details of transmission systems that are general for transmission systems covered by two or more groups H04B 3/00-H04B 13/00.

Details of transmission systems not characterized by the medium used for transmission.

Relationships with other classification places

If the transmission systems are specially adapted for particular applications classification is also made in subclasses listed in section "Informative references".

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

<table>
<thead>
<tr>
<th>Topic</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Narrow band interference in spread spectrum systems</td>
<td>H04B 1/71</td>
</tr>
<tr>
<td>Line transceivers</td>
<td>H04B 3/54</td>
</tr>
<tr>
<td>Monitoring; testing</td>
<td>H04B 17/00</td>
</tr>
<tr>
<td>Spatial arrangements of component circuits in radio pills for living beings</td>
<td>A61B 5/07</td>
</tr>
<tr>
<td>Waveguides; Resonators, lines or other devices of the waveguide type</td>
<td>H01P</td>
</tr>
<tr>
<td>Antennas</td>
<td>H01Q</td>
</tr>
<tr>
<td>Battery chargers</td>
<td>H02J 7/00</td>
</tr>
<tr>
<td>Demodulation or transference of modulation from one carrier to another</td>
<td>H03D</td>
</tr>
<tr>
<td>Amplifier circuits</td>
<td>H03F</td>
</tr>
<tr>
<td>Modifications of amplifiers to reduce non-linear distortion</td>
<td>H03F 1/3241</td>
</tr>
<tr>
<td>Gain Control circuits</td>
<td>H03G</td>
</tr>
<tr>
<td>Filter circuits</td>
<td>H03H</td>
</tr>
<tr>
<td>Tuning resonant circuits</td>
<td>H03J</td>
</tr>
<tr>
<td>Power saving arrangements</td>
<td>H04W 52/02</td>
</tr>
</tbody>
</table>
Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homodyne receiver</td>
<td>A receiver which involves multiplying the modulated received signal by a local oscillator which has the same frequency as that associated with the received signal, so that the received signal will be directly converted into the baseband.</td>
</tr>
<tr>
<td>Superheterodyne receiver</td>
<td>A receiver in which the frequency of the incoming signal is reduced in a mixer or frequency changer by heterodyning with another frequency at the local oscillator. (Heterodyning: combining two sinusoidal frequencies radio frequency waves in a non-linear device resulting in sum and difference frequencies).</td>
</tr>
<tr>
<td>Synchrodyne receiver</td>
<td>A receiver in which a mixing carrier signal is inserted in exact synchronism with the original carrier at the transmitter. Used for the selective detection of signals coded in a certain way.</td>
</tr>
</tbody>
</table>

H04B 1/003

{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)}

Definition statement

This place covers:

Systems wherein components typically implemented in hardware, e.g. filters 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.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

<table>
<thead>
<tr>
<th>Term</th>
<th>H04B 1/003</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cdma</td>
<td>H04B 1/707</td>
</tr>
<tr>
<td>Tdma</td>
<td>H04B 7/2643</td>
</tr>
<tr>
<td>Digital baseband systems</td>
<td>H04L 25/00</td>
</tr>
<tr>
<td>Digital modulation/demodulation</td>
<td>H04L 27/00</td>
</tr>
<tr>
<td>Image transmission</td>
<td>H04N 5/00</td>
</tr>
</tbody>
</table>
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)}

Definition statement
This place covers: selecting a frequency channel within the SDR system

References
Informative references
Attention is drawn to the following places, which may be of interest for search:

| Multiplexing of multicarrier modulation signals | H04L 5/023            |
| Multiplexing of multicarrier modulation signals being represented by different frequencies | H04L 5/06            |

H04B 1/0017
{Digital filtering (H04B 1/001 takes precedence; digital filters per se H03H 17/00)}

References
Limiting references
This place does not cover:

| Using channel filtering with AD/DA conversion at radiofrequency or intermediate frequency stage | H04B 1/001            |
| Impedance networks using digital techniques | H03H 17/00            |

H04B 1/0021
{Decimation, i.e. data rate reduction techniques (H04B 1/0025 takes precedence)}

References
Limiting references
This place does not cover:

| Using a sampling rate lower than twice the highest frequency component of the sampled signal | H04B 1/0025            |
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))

References
Informative references
Attention is drawn to the following places, which may be of interest for search:

| Demodulation of angle-modulated signals | H03D 3/006 |

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))

References
Informative references
Attention is drawn to the following places, which may be of interest for search:

| Quadrature demodulators | H03C 3/40 |
| Quadrature modulators   | H03D 3/007 |

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))

Definition statement
This place covers:
selecting a frequency channel within the SDR system

References
Informative references
Attention is drawn to the following places, which may be of interest for search:

| Multiplexing of multicarrier modulation signals | H04L 5/023 |
| Multiplexing of multicarrier modulation signals being represented by
different frequencies | H04L 5/06 |
**H04B 1/0042**

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

**References**

**Limiting references**

This place does not cover:

<table>
<thead>
<tr>
<th>Using channel filtering with AD/DA conversion at baseband stage</th>
<th><strong>H04B 1/0035</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Impedance networks using digital techniques</td>
<td><strong>H03H 17/00</strong></td>
</tr>
</tbody>
</table>

**H04B 1/005**

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

**Glossary of terms**

In this place, the following terms or expressions are used with the meaning indicated:

| Band                                      | a frequency range with a bandwidth larger than a signal or channel bandwidth, in general covering several communication channels, e.g. AM broadcast band (Medium Wave) or mobile telephone communications band [such as the GSM-900MHz band] |

**H04B 1/006**

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

**References**

**Limiting references**

This place does not cover:

| Using diplexing or multiplexing filters for selecting the desired band | **H04B 1/0057** |

**H04B 1/0064**

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

**References**

**Limiting references**

This place does not cover:

| Common antenna for more than one band | **H04B 1/0053** |
**H04B 1/0071**

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

**References**

**Limiting references**

This place does not cover:

| Using different intermediate frequencies for the different bands | H04B 1/0075 |

**H04B 1/02**

Transmitters

**References**

**Informative references**

Attention is drawn to the following places, which may be of interest for search:

| Spatial arrangements of component circuits in radio pills for living beings | A61B 5/07 |

**H04B 1/03**

Constructional details, e.g. casings, housings

**References**

**Informative references**

Attention is drawn to the following places, which may be of interest for search:

| Arrangements or equipments adapted for airplanes | B64D |

**H04B 1/034**

Portable transmitters

**References**

**Informative references**

Attention is drawn to the following places, which may be of interest for search:

| Means for indicating the location of accidentally buried persons | A63B 29/021 |
| Distress beacons | G01S 1/68 |
H04B 1/036

Cooling arrangements

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

<table>
<thead>
<tr>
<th>Cooling transformers</th>
<th>H01F 27/08</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooling discharge tubes</td>
<td>H01J 7/24, H01J 19/74</td>
</tr>
</tbody>
</table>

H04B 1/04

Circuits

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

<table>
<thead>
<tr>
<th>Power supplies</th>
<th>H04B 1/1607</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oscillators</td>
<td>H03B</td>
</tr>
<tr>
<td>Modulators</td>
<td>H03C 1/00, H03C 3/00, H03C 5/00</td>
</tr>
<tr>
<td>Amplifiers</td>
<td>H03F</td>
</tr>
<tr>
<td>Of television transmitters</td>
<td>H04N 5/38</td>
</tr>
</tbody>
</table>

H04B 1/0458

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

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| Matching circuits in general | H03H |

H04B 1/0466

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

References

Limiting references

This place does not cover:

| Transmitters with multiple parallel paths | H04B 1/0483 |
H04B 1/0475
{with means for limiting noise, interference or distortion (H04B 1/0483 takes precedence)}

References

Limiting references
This place does not cover:

| Transmitters with multiple parallel paths | H04B 1/0483 |

Informative references
Attention is drawn to the following places, which may be of interest for search:

| Detection of non-compliance or faulty performance in transmitters | H04B 17/17 |

H04B 1/06
Receivers

References

Informative references
Attention is drawn to the following places, which may be of interest for search:

| Control of amplification | H03G |
| Television receivers | H04N 5/44, H04N 5/64 |

H04B 1/082
{to be used in vehicles (H04B 1/086 takes precedence; holding or mounting accessories B60R 11/02)}

References

Limiting references
This place does not cover:

| Portable receivers | H04B 1/086 |

Informative references
Attention is drawn to the following places, which may be of interest for search:

| Holding or mounting accessories | B60R 11/02 |
H04B 1/10
Means associated with receiver for limiting or suppressing noise or interference

References
Informative references
Attention is drawn to the following places, which may be of interest for search:

<table>
<thead>
<tr>
<th>Reference</th>
<th>H04B 1/7097</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spread spectrum systems</td>
<td></td>
</tr>
<tr>
<td>Equalising on HF or IF</td>
<td>H04B 7/005</td>
</tr>
<tr>
<td>Diversity systems</td>
<td>H04B 7/02</td>
</tr>
<tr>
<td>Elimination of image frequencies</td>
<td>H03D 7/18</td>
</tr>
<tr>
<td>Noise suppression by control of amplification</td>
<td>H03G 3/00, H03G 5/00, H03G 7/00</td>
</tr>
<tr>
<td>Squelching</td>
<td>H03G 3/26, H03G 3/34</td>
</tr>
</tbody>
</table>

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 H01Q 7/04; feeders for aerials H01Q 9/00))

References
Informative references
Attention is drawn to the following places, which may be of interest for search:

<table>
<thead>
<tr>
<th>Reference</th>
<th>H01Q 7/04</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screened aerials</td>
<td></td>
</tr>
<tr>
<td>Feeders for aerials</td>
<td>H01Q 9/00</td>
</tr>
</tbody>
</table>

H04B 1/1018
{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)}

References
Informative references
Attention is drawn to the following places, which may be of interest for search:

<table>
<thead>
<tr>
<th>Reference</th>
<th>H04B 1/1607</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power supplies</td>
<td></td>
</tr>
<tr>
<td>Suppression or limitation of noise from electric apparatus</td>
<td>H04B 15/00</td>
</tr>
<tr>
<td>Ripple filters</td>
<td>H02M 1/14</td>
</tr>
<tr>
<td>Demodulation</td>
<td>H03D</td>
</tr>
<tr>
<td>Filters in general</td>
<td>H03H</td>
</tr>
</tbody>
</table>
**H04B 1/1036**

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

**References**

**Limiting references**

This place does not cover:

<table>
<thead>
<tr>
<th>Topic</th>
<th>CPC Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Using adaptive balancing or compensation means</td>
<td>H04B 1/123</td>
</tr>
<tr>
<td>Narrow band interference reduction in spread spectrum systems</td>
<td>H04B 1/71</td>
</tr>
</tbody>
</table>

**Informative references**

Attention is drawn to the following places, which may be of interest for search:

<table>
<thead>
<tr>
<th>Topic</th>
<th>CPC Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filter circuits</td>
<td>H03H</td>
</tr>
</tbody>
</table>

**H04B 1/1081**

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

**References**

**Limiting references**

This place does not cover:

<table>
<thead>
<tr>
<th>Topic</th>
<th>CPC Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduction of multipath noise by equalising</td>
<td>H04B 7/005</td>
</tr>
</tbody>
</table>

**H04B 1/109**

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

**Glossary of terms**

In this place, the following terms or expressions are used with the meaning indicated:

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unwanted signal</td>
<td>signals outside the wanted signal bandwidth</td>
</tr>
</tbody>
</table>

**H04B 1/12**

Neutralising, balancing, or compensation arrangements

**References**

**Informative references**

Attention is drawn to the following places, which may be of interest for search:

<table>
<thead>
<tr>
<th>Topic</th>
<th>CPC Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Balancing ripple filters</td>
<td>H04B 15/005, H02M 1/143</td>
</tr>
</tbody>
</table>
H04B 1/123
{using adaptive balancing or compensation means (adaptive filter circuits and algorithms H03H)}

References
Informative references
Attention is drawn to the following places, which may be of interest for search:

| Adaptive filter circuits and algorithms | H03H |

H04B 1/126
{having multiple inputs, e.g. auxiliary antenna for receiving interfering signal (aerials in general H01Q)}

References
Informative references
Attention is drawn to the following places, which may be of interest for search:

| Aerials in general | H01Q |

H04B 1/16
Circuits

References
Informative references
Attention is drawn to the following places, which may be of interest for search:

| Demodulators | H03D |

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

References
Limiting references
This place does not cover:

| Voltage stabilisers | G05F 1/46 |
| Converters | H02M |
| Filters for converters | H02M 1/14 |
| Power saving arrangements | H04W 52/02 |
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)}

References

Limiting references
This place does not cover:

<table>
<thead>
<tr>
<th>Muting amplifiers by gain control</th>
<th>H03G 3/34</th>
</tr>
</thead>
<tbody>
<tr>
<td>Details of power consumption reduction in a PLL</td>
<td>H03L 7/0802, H03L 7/14, H03L 2207/00</td>
</tr>
<tr>
<td>Power saving arrangements</td>
<td>H04W 52/02</td>
</tr>
</tbody>
</table>

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)}

References

Informative references
Attention is drawn to the following places, which may be of interest for search:

<table>
<thead>
<tr>
<th>Negative impedance networks for line transmission systems</th>
<th>H04B 3/16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amplifiers</td>
<td>H03F</td>
</tr>
</tbody>
</table>

H04B 1/1638

{Special circuits to enhance selectivity of receivers not otherwise provided for (resonant circuits H03H)}

References

Informative references
Attention is drawn to the following places, which may be of interest for search:

| Resonant circuits; filters | H03H      |
H04B 1/1646
{adapted for the reception of stereophonic signals}

References
Informative references
Attention is drawn to the following places, which may be of interest for search:

| Broadcast stereophonic receivers | H04H 40/36 |

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

References
Informative references
Attention is drawn to the following places, which may be of interest for search:

| Volume compression or expansion in amplifiers | H03G 7/00 |

H04B 1/20
for coupling gramophone pick-up, recorder output, or microphone to receiver

References
Informative references
Attention is drawn to the following places, which may be of interest for search:

| Constructional details for associated working of receivers and recording devices | G11B 31/003 |
| For television signals only | H04N 5/00 |

H04B 1/202
{by remote control}

References
Informative references
Attention is drawn to the following places, which may be of interest for search:

| Remote controllers | G08C |
H04B 1/207
{with an audio or audio/video bus for signal distribution (H04B 1/205 takes precedence)}

References
Limiting references
This place does not cover:

| With control bus for exchanging commands | H04B 1/205 |

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

References
Limiting references
This place does not cover:

| Older documents covering circuits with vacuum tubes | H04B 1/22 |

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

References
Limiting references
This place does not cover:

| Older documents covering circuits with vacuum tubes | H04B 1/28 |

Glossary of terms
In this place, the following terms or expressions are used with the meaning indicated:

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superheterodyne receiver</td>
<td>A receiver in which the frequency of the incoming signal is reduced in a mixer or frequency changer by heterodyning with another frequency at the local oscillator. (Heterodyning: combining two sinusoidal frequencies radio frequency waves in a non-linear device resulting in sum and difference frequencies).</td>
</tr>
<tr>
<td>If</td>
<td>Intermediate Frequency</td>
</tr>
<tr>
<td>Lo</td>
<td>local oscillator</td>
</tr>
</tbody>
</table>

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

Definition statement
This place covers:
Additionally, super-regenerative receivers can be found in this group

Glossary of terms
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<tr>
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<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homodyne receiver</td>
<td>A receiver which involves multiplying the modulated received signal by a local oscillator which has the same frequency as that associated with the received signal, so that the received signal will be directly converted into the baseband.</td>
</tr>
<tr>
<td>Synchrodyne receiver</td>
<td>A receiver in which a mixing carrier signal is inserted in exact synchronism with the original carrier at the transmitter. Used for the selective detection of signals coded in a certain way.</td>
</tr>
</tbody>
</table>

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

References
Informative references
Attention is drawn to the following places, which may be of interest for search:

<table>
<thead>
<tr>
<th>Demodulator circuits</th>
<th>H03D 1/24</th>
</tr>
</thead>
</table>

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

References
Limiting references
This place does not cover:

<table>
<thead>
<tr>
<th>Construction of portable transceivers</th>
<th>H04B 1/034</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specially adapted to be fitted into airplanes</td>
<td>B64D 43/00</td>
</tr>
</tbody>
</table>

Informative references
Attention is drawn to the following places, which may be of interest for search:

<table>
<thead>
<tr>
<th>Paging systems</th>
<th>G08B 3/10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic between a small number of stations with amplifiers or loudspeakers</td>
<td>H04M 9/001</td>
</tr>
<tr>
<td>Wireless communication networks</td>
<td>H04W</td>
</tr>
</tbody>
</table>
**H04B 1/3816**

Mechanical arrangements for accommodating identification devices, e.g. cards or chips; with connectors for programming identification devices

**References**

**Informative references**

Attention is drawn to the following places, which may be of interest for search:

| Details of identification cards | G06K 19/00 |

**H04B 1/3822**

specially adapted for use in vehicles (**H04B 1/3827** takes precedence)

**References**

**Limiting references**

This place does not cover:

| Portable transceivers | H04B 1/3827 |
| Arrangements for holding or mounting accessories | B60R 11/02 |

**H04B 1/3838**

{Arrangements for reducing RF exposure to the user, e.g. by changing the shape of the transceiver while in use}

**References**

**Limiting references**

This place does not cover:

| Means for shaping the antenna pattern | H01Q 1/245 |

**H04B 1/3877**

Arrangements for enabling portable transceivers to be used in a fixed position, e.g. cradles or boosters

**Definition statement**

This place covers:

Cradles ; Car kits ; boosters

**References**

**Informative references**

Attention is drawn to the following places, which may be of interest for search:

| For portable telephone terminals | H04M 1/72519 |
H04B 1/3883
Arrangements for mounting batteries or battery chargers

References

Limiting references
This place does not cover:

| Battery chargers | H02J 7/00 |

H04B 1/401
for selecting or indicating operating mode

References

Informative references
Attention is drawn to the following places, which may be of interest for search:

| In portable telephone terminals | H04M 1/72519 |

H04B 1/406
{with more than one transmission mode, e.g. analog and digital modes}

References

Informative references
Attention is drawn to the following places, which may be of interest for search:

| Multiband transceivers | H04B 1/005 |

H04B 1/44
Transmit/receive switching

References

Limiting references
This place does not cover:

| Transmit/receive switching in radar systems | G01S 7/034 |

H04B 1/46
by voice-frequency signals; by pilot signals

References

Limiting references
This place does not cover:

| Echo suppression | H04B 3/20 |
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\}

References
Limiting references
This place does not cover:

By voice-frequency signals; by pilot signals  H04B 1/46

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

References
Limiting references
This place does not cover:

Microwave multiplexers  H01P 1/213
Multiport networks  H03H 7/46

H04B 1/525
with means for reducing leakage of transmitter signal into the receiver

References
Limiting references
This place does not cover:

For repeater stations  H04B 7/15564

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

References
Limiting references
This place does not cover:

microwave multiplexers  H01P 1/213
Conjugate coupling devices of the waveguide type  H01P 5/16
For two-way amplifiers  H03F 3/62
Balance/unbalance networks  H03H 7/42, H03H 11/32
multiport networks
Multiport networks
In multiplex communication

Informative references
Attention is drawn to the following places, which may be of interest for search:

Construction of transformers

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

References
Informative references
Attention is drawn to the following places, which may be of interest for search:

Light transmission systems

H04B 1/59
Responders; Transponders

References
Informative references
Attention is drawn to the following places, which may be of interest for search:

Relay systems

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

References
Informative references
Attention is drawn to the following places, which may be of interest for search:

For optical transmitters
H04B 1/64
Volume compression or expansion arrangements

References
Informative references
Attention is drawn to the following places, which may be of interest for search:

| For amplifiers | H03G 7/00 |

H04B 1/66
for reducing bandwidth of signals; for improving efficiency of transmission (H04B 1/68 takes precedence)

References
Informative references
Attention is drawn to the following places, which may be of interest for search:

<table>
<thead>
<tr>
<th>Vocoders</th>
<th>G10L</th>
</tr>
</thead>
<tbody>
<tr>
<td>In pictorial communication systems</td>
<td>H04N</td>
</tr>
</tbody>
</table>

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

References
Informative references
Attention is drawn to the following places, which may be of interest for search:

| Perceptual coders         | G10L 19/02 |

H04B 1/68
for wholly or partially suppressing the carrier or one side band

References
Informative references
Attention is drawn to the following places, which may be of interest for search:

<table>
<thead>
<tr>
<th>Single sideband receivers</th>
<th>H04B 1/302</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modulator circuits</td>
<td>H03C 1/52, H03C 1/60</td>
</tr>
<tr>
<td>For data transmission</td>
<td>H04L 27/02</td>
</tr>
</tbody>
</table>
**H04B 1/69**

Spread spectrum techniques

**Definition statement**

*This place covers:*

Spread spectrum techniques representing methods by which communication energy generated in a particular bandwidth is deliberately spread in the frequency domain, resulting in a signal with a wider bandwidth.

**Relationships with other classification places**

With regard to code multiplexing, the borderline between H04B 1/69 and H04J 13/00 should be determined based on whether the features relevant for classification are focused on the code multiplexing aspects or the implementation of the spread-spectrum technique (e.g. details of how the signals are physically transmitted, received and processed).

**References**

**Informative references**

Attention is drawn to the following places, which may be of interest for search:

<table>
<thead>
<tr>
<th>Topic</th>
<th>CPC code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Narrowband interference reduction</td>
<td>H04B 1/1036</td>
</tr>
<tr>
<td>Code multiplexing</td>
<td>H04J 13/00</td>
</tr>
<tr>
<td>Carrier synchronization per se</td>
<td>H04L 7/06</td>
</tr>
<tr>
<td>Multicarrier techniques</td>
<td>H04L 27/2601</td>
</tr>
</tbody>
</table>

**Special rules of classification**

Classification of invention and additional information:

The invention information (main focus of the document) is classified in CPC groups and is compulsory.

Additional information is classified in Indexing Codes corresponding to the CPC groups. Classification of additional information is compulsory.

Indexing Codes which have no corresponding CPC group are used to classify invention information (compulsory) or additional information (compulsory). When classifying invention information, the most appropriate CPC group must also be assigned.

Examples:

Invention relating to spread spectrum chirp is assigned H04B 2001/6912 and H04B 1/69

Invention relating to spread spectrum time hopping with additional information on frequency hopping is assigned H04B 2001/6908 and H04B 1/69 and H04B 1/713

Invention relating to impulse radio with additional information on time hopping is assigned H04B 1/7163 and H04B 2001/6908

**Combinations**

For cases where the invention relates to combining the features of two or more subgroups, the following should be applied:

If the relevant information relates only to the fact that the aspects are combined, the documents are classified with CPC in the group above the concerned subgroups and assigned an Indexing Code in
each of the concerned subgroups. If there is a dedicated entry for combinations this CPC is assigned instead of the headgroup.

If, besides the combination, aspects relating to the subgroups are also relevant, then multiple CPC groups may be assigned as appropriate.

Examples:

Invention relating to frequency hopping/direct sequence combination is assigned H04B 1/692, H04B 1/707, H04B 1/713

Invention relating to frequency hopping/direct sequence system with a focus on frequency hopping interference issues is assigned H04B 1/692, H04B 1/707, H04B 1/715

Invention relating to frequency hopping interference issues which can applied to Frequency hopping/ Direct Sequence systems is assigned H04B 1/715, H04B 1/692, H04B 1/707

Inventive combination of parallel and subtractive interference cancellation for direct sequence system is assigned H04B 1/7107, H04B 1/71072, H04B 1/71075

Note(s)

When classifying in this group, any aspect of code division multiplexing, which is considered to represent information of interest for search, may also be classified in group H04J 13/00.

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rake</td>
<td>A receiver comprising sub-receivers called fingers wherein each finger detects a single multipath component. The contributions of the fingers can be combined at a later stage</td>
</tr>
</tbody>
</table>

Synonyms and Keywords

In patent documents, the following abbreviations are often used:

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>UWB</td>
<td>ultra-wideband</td>
</tr>
<tr>
<td>DSSS</td>
<td>direct sequence spread spectrum</td>
</tr>
<tr>
<td>CDMA</td>
<td>code division multiple access</td>
</tr>
<tr>
<td>FH</td>
<td>frequency hopping</td>
</tr>
</tbody>
</table>

**H04B 1/692**

Hybrid techniques using combinations of two or more spread spectrum techniques

Definition statement

This place covers:

Hybrids of spread spectrum techniques, e.g. frequency hopping/direct-sequence systems, time-hopping/direct-sequence systems.
**H04B 1/707**

**using direct sequence modulation**

**Definition statement**

*This place covers:*

Direct-sequence spread-spectrum techniques which directly modulate the data being transmitted by a spreading code whose frequency (chip rate) is much higher than the modulated bandwidth of the data signal (symbol rate).

An example of direct sequence modulation is CDMA (Code Division Multiple Access). Examples of systems are IS-95 (Interim Standard 2000), CDMA 2000, UMTS (Universal Mobile Telephone System), WCDMA (Wideband Code Division Multiple Access).

**References**

*Limiting references*

*This place does not cover:*

| Aspects relating to the codes e.g. types of codes, code generation and code allocation | H04J 13/00 |
| Carrier synchronization per se | H04L 7/06 |

**H04B 1/713**

**using frequency hopping**

**Definition statement**

*This place covers:*

Frequency-hopping spread spectrum techniques which involve transmitting radio signals by switching a carrier among many frequency channels, using a hopping sequence known to both transmitter and receiver.

**H04B 1/7163**

**using impulse radio**

**Definition statement**

*This place covers:*

Impulse radio spread spectrum which involve an ultra-wideband (UWB) communication system that transmits baseband pulses of very short duration (typically of the order of a nanosecond) with bandwidths that span from near dc to several GHz.

**References**

*Limiting references*

*This place does not cover:*

| Non-pulse systems which meet the requirements of the FCC mask for UWB communication (e.g. UWB OFDM systems) | H04J 11/00 , H04L 27/26 or H04L 5/00 |
Special rules of classification

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 1/72
Circuits or components for simulating antennas, e.g. dummy antennas

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| Dissipative waveguide terminations | H01P 1/26 |

H04B 1/76
Pilot transmitters or receivers for control of transmission or for equalising

Special rules of classification

This group is not used. See H04W 52/00 or H04L 25/00

H04B 3/00
Line transmission systems (combined with near-field transmission systems H04B 5/00)

Definition statement

This place covers:

Transmission systems characterized by the medium being electrical conductors (e.g. wires, metal cables) or waveguides.

subgroups H04B 3/00-H04B 3/50, H04B 3/34-H04B 3/52 cover

Data or signal transmission using twisted pair, coaxial cable, submarine cables, wave guides. These subgroups deal as well with the reliability of the line transmission system, including testing of the line transmission parameters, compensation of echo due to impedance mismatching, equalizing and interference

• subgroup H04B 3/32 covers

These subgroup deal with all technical aspects concerning crosstalk compensation or cancellation in a multi-wire line transmission.

• subgroups H04B 3/54-H04B 3/60 cover

Data communication using existing mains power cable already installed in the building infrastructure or in vehicles. This subgroup contains as well data transmission over high voltage (HV) power cables.

References

Limiting references

This place does not cover:

| Near-field transmission system | H04B 5/00 |
### Informative references

Attention is drawn to the following places, which may be of interest for search:

<table>
<thead>
<tr>
<th>Topic</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hybrid circuits for transceivers</td>
<td>H04B 1/52, H04B 1/58</td>
</tr>
<tr>
<td>Wireless repeater</td>
<td>H04B 7/155</td>
</tr>
<tr>
<td>Suppression or limitation of noise or interference</td>
<td>H04B 15/00</td>
</tr>
<tr>
<td>Electricity meters</td>
<td>G01R 22/06</td>
</tr>
<tr>
<td>Testing cables properties</td>
<td>G01R 31/00</td>
</tr>
<tr>
<td>Alarm system using power transmission lines</td>
<td>G08B 25/06</td>
</tr>
<tr>
<td>Communication cables or conductors</td>
<td>H01B 11/00</td>
</tr>
<tr>
<td>Load coils</td>
<td>H01F 17/08</td>
</tr>
<tr>
<td>Waveguides; Resonators, lines or other devices of the waveguide type</td>
<td>H01P</td>
</tr>
<tr>
<td>Hybrid junctions of waveguide</td>
<td>H01P 5/16</td>
</tr>
<tr>
<td>Circuit arrangements for providing remote indication of network condition</td>
<td>H02J 13/00</td>
</tr>
<tr>
<td>Control of amplification in general</td>
<td>H03G</td>
</tr>
<tr>
<td>Transversal Filters</td>
<td>H03H 15/00</td>
</tr>
<tr>
<td>Digital adaptive filters</td>
<td>H03H 21/0012</td>
</tr>
<tr>
<td>Error detection and prevention</td>
<td>H04L 1/00</td>
</tr>
<tr>
<td>Multi-carrier modulation system</td>
<td>H04L 5/0001</td>
</tr>
<tr>
<td>Power over Ethernet</td>
<td>H04L 12/10</td>
</tr>
<tr>
<td>Home Automation Networks</td>
<td>H04L 12/2803</td>
</tr>
<tr>
<td>Extract feeding power from signals</td>
<td>H04L 25/02</td>
</tr>
<tr>
<td>Differential Transmission</td>
<td>H04L 25/0272</td>
</tr>
<tr>
<td>Decision Feedback Equalizers</td>
<td>H04L 25/03057</td>
</tr>
<tr>
<td>Shaping frequency spectrum at the transmitter</td>
<td>H04L 25/03343</td>
</tr>
<tr>
<td>Line Equalizers</td>
<td>H04L 25/03878</td>
</tr>
<tr>
<td>Acoustic echo cancellation</td>
<td>H04M 9/082</td>
</tr>
</tbody>
</table>

### Special rules of classification

Indexing Codes for the subgroups **H04B 3/54-H04B 3/58**, to be used for classifying additional information:

- **H04B 2203/54**
  - Methods of transmitting or receiving signals via power distribution lines

- **H04B 2203/5408**
  - using protocols including special data frame format, hybrid networks

- **H04B 2203/5412**
  - by modifying waveform of the power source. Including interrupting power mains waveform via a switch, Triac, Scr.

- **H04B 2203/5416**
by adding signals to the wave form of the power source. Injecting in the mains a modulated signal at much higher frequency of the mains

H04B 2203/542

using zero crossing information

H04B 2203/5425

improving S/N ratio and or coupling factor by impedance matching, noise reduction, gain control

H04B 2203/5429

Applications for powerline communications

H04B 2203/5433

Remote metering, smart grids, AMR

H04B 2203/5437

Wired telephone (Eg. PSTN, ADSL). Including interfaces between power line network and wired telephone network

H04B 2203/5441

Wireless systems or telephone. Including interfaces between power line network and wireless network (e.g., GSM, RF transmission, Infrared)

H04B 2203/5445

Local network. Using the power line to create a local network

H04B 2203/545

Audio/video application, (e.g. interphone, audio video broadcasting)

H04B 2203/5454

Adapter and plugs. Including Home Plug and smart sockets.

H04B 2203/5458

Monitor sensor, Load control or drive; Alarm systems, Home automation, Zigbee.

H04B 2203/5462

Systems for power line communications

H04B 2203/5466

using three phases conductors

H04B 2203/547

via DC power distribution e.g. vehicles

H04B 2203/5475

adapted for drill or well combined with data transmission H04B 2203/5479 using repeaters

H04B 2203/5483- H04B 2203/5487
using coupling circuits, cables

H04B 2203/5491

using filtering and bypassing

H04B 2203/5495

having measurements and testing channel

Synonyms and Keywords

In patent documents, the following abbreviations are often used:

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plc</td>
<td>Power line communication</td>
</tr>
<tr>
<td>Plcc</td>
<td>Power line carrier communication</td>
</tr>
<tr>
<td>Mv</td>
<td>Medium Voltage</td>
</tr>
<tr>
<td>Hv</td>
<td>High Voltage</td>
</tr>
<tr>
<td>Ofdm</td>
<td>Orthogonal Frequency Division Multiplexing</td>
</tr>
<tr>
<td>Lan</td>
<td>Local Area Network</td>
</tr>
<tr>
<td>Pstn</td>
<td>Public Switched Telephone Network</td>
</tr>
</tbody>
</table>

H04B 3/03

Hybrid circuits (for transceivers H04B 1/52, H04B 1/58)

References

Limiting references

This place does not cover:

For transceivers H04B 1/52, H04B 1/58

Informative references

Attention is drawn to the following places, which may be of interest for search:

Hybrid junctions of the waveguide type H01P 5/16

H04B 3/04

Control of transmission; Equalising

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Control of amplification in general H03G
H04B 3/26
Improving frequency characteristic by the use of loading coils

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| Loading coils per se | H01F 17/08 |

H04B 3/36
Repeater circuits (H04B 3/58 takes precedence)

References

Limiting references

This place does not cover:

| Repeater circuits | H04B 3/58 |

Informative references

Attention is drawn to the following places, which may be of interest for search:

| Amplifiers therefor | H03F |

H04B 3/58
Repeater circuits

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| Amplifiers therefor | H03F |

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

Definition statement

This place covers:

Transmission systems of a limited range wherein the information signal transmission is inductive or capacitive, rather than electromagnetic, e.g. inductive loop type

Transmission systems operating in the low frequency and high frequency bands with reduced range and relatively short reading distances well within the radian sphere defined by $\frac{\lambda}{2\pi}$ (wherein $\lambda$ corresponds to the wavelength of the transmission signal). Near field communication systems are asymmetrical systems which do not allow a duplex communication initiated at both ends. The transmission of power is also inductive or capacitive, rather than electromagnetic.
References

Limiting references

This place does not cover:

<table>
<thead>
<tr>
<th>Topic</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read/write systems for railways</td>
<td>B61L 3/12</td>
</tr>
<tr>
<td>Radiating cables for railways</td>
<td>B61L 3/22</td>
</tr>
<tr>
<td>Record carriers</td>
<td>G06K 7/00, G06K 19/00</td>
</tr>
<tr>
<td>Paging systems in general</td>
<td>G08B</td>
</tr>
<tr>
<td>Transmitting signals using magnetically coupled devices</td>
<td>G08C 17/04</td>
</tr>
<tr>
<td>Transmitting signals using capacity coupling</td>
<td>G08C 17/06</td>
</tr>
<tr>
<td>Transformers or inductances adapted for inductive coupling</td>
<td>H01Q 7/00</td>
</tr>
<tr>
<td>Leaky cables per se</td>
<td>H01Q 13/20</td>
</tr>
</tbody>
</table>

Informative references

Attention is drawn to the following places, which may be of interest for search:

<table>
<thead>
<tr>
<th>Topic</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensing electronic for record carriers</td>
<td>G06K 7/10336, G06K 7/10118</td>
</tr>
<tr>
<td>Card readers, RFID cards</td>
<td>G06K 19/0723, G06K 7/0008</td>
</tr>
<tr>
<td>Rfid in payment systems</td>
<td>G07F 7/00, G06Q 20/00, G07G, G07F 11/00</td>
</tr>
<tr>
<td>Transmitting signals using magnetically coupled devices</td>
<td>G08C 17/04</td>
</tr>
<tr>
<td>Transmitting signals using capacity coupling</td>
<td>G08C 17/06</td>
</tr>
</tbody>
</table>

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nfc</td>
<td>near field communication</td>
</tr>
</tbody>
</table>

H04B 5/0031

(for data transfer)

Definition statement

This place covers:

Only data transfer

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

<table>
<thead>
<tr>
<th>Topic</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data and power transfer</td>
<td>H04B 5/0037</td>
</tr>
</tbody>
</table>
H04B 5/0037

{for power transfer}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| Data and power transfer                                      | H04B 5/0037 |

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)}

References

Limiting references

This place does not cover:

| Record carriers for railways                                 | B61L 3/12 |

H04B 5/0062

{in RFID [Radio Frequency Identification] Systems}

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

| Rfid | Radio Frequency Identification |

H04B 5/0075

{using inductive coupling (transformers or inductances adapted for inductive coupling H01F 38/14)}

References

Limiting references

This place does not cover:

| Transformers or inductances adapted for inductive coupling | H01F 38/14 |
H04B 5/0081
{with antenna coils (loop aerials H01Q 7/00)}

References

Limiting references
This place does not cover:

| Loop aerials               | H01Q 7/00 |

H04B 7/00

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

Definition statement
This place covers:
Radio transmission systems wherein the information signal transmission is by electromagnetic waves other than light or infra-red.

References

Limiting references
This place does not cover:

<table>
<thead>
<tr>
<th>Near-field transmission systems, e.g. inductive loop type</th>
<th>H04B 5/00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmission systems employing beams of corpuscular radiation, or electromagnetic waves other than radio waves, e.g. light, infra-red</td>
<td>H04B 10/00</td>
</tr>
<tr>
<td>Suppression or limitation of noise or interference</td>
<td>H04B 15/00</td>
</tr>
</tbody>
</table>

Informative references

Attention is drawn to the following places, which may be of interest for search:

<table>
<thead>
<tr>
<th>Diversity systems specially adapted for direction finding</th>
<th>G01S 3/72</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systems using reradiation of radio waves, e.g. secondary radar systems; Analogous systems</td>
<td>G01S 13/74</td>
</tr>
<tr>
<td>Aerials</td>
<td>H01Q</td>
</tr>
<tr>
<td>Selecting arrangements to which subscribers are connected via radio links</td>
<td>H04W</td>
</tr>
</tbody>
</table>

Synonyms and Keywords

In patent documents, the following abbreviations are often used:

<table>
<thead>
<tr>
<th>CDMA</th>
<th>Code Division Multiple Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>CDMA - TDMA</td>
<td>Hybrid Code- Time Division Multiple Access</td>
</tr>
<tr>
<td>FDMA</td>
<td>Frequency Division Multiple Access</td>
</tr>
<tr>
<td>FDMA - TDMA</td>
<td>Hybrid Frequency Time Division Multiple Access</td>
</tr>
<tr>
<td>SDMA</td>
<td>Space Division Multiple Access</td>
</tr>
<tr>
<td>SSMA</td>
<td>Spread-Spectrum Multiple Access</td>
</tr>
<tr>
<td>------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>TDMA</td>
<td>Time Division Multiple Access</td>
</tr>
</tbody>
</table>

**H04B 7/005**

**Control of transmission; Equalising**

**References**

*Informative references*

Attention is drawn to the following places, which may be of interest for search:

<table>
<thead>
<tr>
<th>Equalizers</th>
</tr>
</thead>
<tbody>
<tr>
<td>H04L 25/00, H04L 27/00</td>
</tr>
</tbody>
</table>

**H04B 7/01**

**Reducing phase shift**

**Definition statement**

This place covers:

Reducing phase shift to compensate for Doppler effect

**H04B 7/02**

**Diversity systems; Multi-antenna system, i.e. transmission or reception using multiple antennas (RAKE receivers H04B 1/7115)**

**Definition statement**

This place covers:

- the use of one or more antennas to transmit or receive signals, characterised by separation in time, phase, frequency, polarisation, angle or spacing; the improvement thereby being of channel quality and reliability;
- aspects of diversity, beamforming and antenna weighting;
- the generation of antenna weights for multiple antennas;
- the feedback of information in order to assign weights for multiple antennas;
- the transmission through multiple beams, for single or multiple users;
- the combination or selection of signals from one or more fading channels by using characteristics thereof or correlation.

Aspects related to diversity, beamforming and antenna weighting:

- when the signal has diverse possibilities of being transmitted/ received through one or several antennas with different characteristics (including time, frequency, space, polarization, angle, phase...); "diverse possibilities" means the signal does not always have to be transmitted by more than one antenna. The diversity in this case would be achieved in the channel between the transmitter and receiver. This channel diversity is aimed to increase quality and reliability at the receiver;
- exploiting gain of one or more fading channels either uncorrelated or correlated (such as single beamforming and pre-coding);
- transmission through multiple beams for single user and multiple user;
- feedback of information in order to assign weights and improve reliability of the signal in transmission/ reception;
• generation of antenna weights for multiple antennas;
• transmission of a plurality of different signals from different antennas, wherein at least one of said signals is transmitted (potentially weighted) from more than one antenna; for example MIMO transmission for N different streams via M different antennas, where M linear combinations of the N streams are transmitted, each linear combination being transmitted from each antenna.

Relationships with other classification places
Antenna redundancy, namely the inclusion of spare antennas for the easy replacement of malfunctioning antennas, is not considered to be a multi-antenna system and therefore is not covered by this group. Details of transmission systems for increasing reliability, e.g. using redundancy, are covered by group H04B 1/74.

References

Limiting references
This place does not cover:

| Reducing multipath interference in spread spectrum systems | H04B 1/7115 |
| RAKE receivers | H04B 1/7115 |

Informative references
Attention is drawn to the following places, which may be of interest for search:

| Relay systems | H04B 7/15 |
| Specially adapted for satellite systems | H04B 7/18534 |
| Direction finding | G01S 3/72 |
| Aerial arrays or systems | H01Q |
| Pure time diversity | H04L 1/00 |
| For digital data transmission as such | H04L 1/02 |
| Space-time coding | H04L 1/0618 |
| Pre-equalising for ISI-reduction | H04L 25/03343 |
| Providing wireless coverage using beam steering for defining the cell structure, e.g. space division multiple access [SDMA] | H04W 16/28 |

H04B 7/022
Site diversity; Macro-diversity (using two or more spaced independent antennas H04B 7/04)

References

Limiting references
This place does not cover:

| Site diversity or macro-diversity using two or more spaced independent antennas | H04B 7/04 |
**Informative references**

Attention is drawn to the following places, which may be of interest for search:

<table>
<thead>
<tr>
<th>Multicasting of data during hand-off to several target access points</th>
</tr>
</thead>
<tbody>
<tr>
<td>H04W 36/026</td>
</tr>
</tbody>
</table>

**Glossary of terms**

In this place, the following terms or expressions are used with the meaning indicated:

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site diversity</td>
<td>The technique of linking two or more ground stations receiving the same signal. This way, if the signal is heavily attenuated in one area, other ground stations can compensate.</td>
</tr>
<tr>
<td>Macro-diversity</td>
<td>In the field of wireless communication, macro-diversity is a kind of spatial diversity scheme using several antennas to transmit or receive wireless signals, wherein the distance between the antennas is much longer than the wavelength in use. This diversity technique limits the effects of fading in radio communications. The terms ‘macro-diversity’ and ‘site diversity’, are sometimes used synonymously in the art.</td>
</tr>
</tbody>
</table>
H04B 7/024
Co-operative use of antennas of several sites, e.g. in co-ordinated multipoint or co-operative multiple-input multiple-output [MIMO] systems

Definition statement
This place covers:
Example of documents classified here: see US2010034146 (figure 7):

H04B 7/026
Co-operative diversity, e.g. using fixed or mobile stations as relays

References
Limiting references
This place does not cover:

<table>
<thead>
<tr>
<th>Relay systems</th>
<th>H04B 7/14</th>
</tr>
</thead>
<tbody>
<tr>
<td>relays per se in CoMP</td>
<td>H04B 7/15592</td>
</tr>
<tr>
<td>cooperative coding</td>
<td>H04L 1/0077</td>
</tr>
</tbody>
</table>
H04B 7/028
{Spatial transmit diversity using a single antenna at the transmitter}

**Definition statement**

*This place covers:*

Example of documents classified in this group: see e.g. US2011070840 (abstract): "... The antenna(s) are spatially translated in an arbitrary trajectory. As the antenna(s) is being spatially translated, a data processing means samples the incoming signal at set intervals based on a clock signal provided by a system clock. By sampling the incoming signal at different times at different spatial locations on the arbitrary trajectory, the system acts as a synthetic antenna array. The different samplings of the incoming signal at different times and positions provide signal diversity gain as well as different readings which can be used to estimate and/or calculate various parameters of the incoming signal."

H04B 7/04

using two or more spaced independent antennas

**Definition statement**

*This place covers:*

Plurality of spaced independent aerials, both correlated (beamforming) or non-correlated (diversity) at transmitter or receiver or both, either using simultaneous transmission/reception (e.g. for beamforming) or successive transmission/reception (antenna switching/selection).

H04B 7/0408

using two or more beams, i.e. beam diversity

**Definition statement**

*This place covers:*

Example of documents classified here: see WO2009046409 (figures 4, 7)

**References**

*Informative references*

Attention is drawn to the following places, which may be of interest for search:

| Transmitter beamforming | H04B 7/0617 |

H04B 7/0413

MIMO systems

**Definition statement**

*This place covers:*

transmission of a plurality of different signals from different antennas, wherein at least one of said signals is transmitted (potentially weighted) from more than one antenna; for example MIMO transmission for N different streams via M different antennas, where M linear combinations of the N streams are transmitted, each linear combination being transmitted from each antenna.

**Special rules of classification**

This group takes precedence over the transmit/receive diversity groups H04B 7/06 and H04B 7/08.
Synonyms and Keywords

*In patent documents, the following abbreviations are often used:*

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIMO</td>
<td>Multiple Input Multiple Output</td>
</tr>
<tr>
<td>SIMO</td>
<td>Single Input Multiple Output</td>
</tr>
<tr>
<td>MISO</td>
<td>Multiple Input Single Output</td>
</tr>
</tbody>
</table>

**H04B 7/0417**

Feedback systems

**References**

*Informative references*

*Attention is drawn to the following places, which may be of interest for search:*

| Details of feedback | H04B 7/0619 |
H04B 7/0421

{utilizing implicit feedback, e.g. steered pilot signals}

Definition statement

This place covers:

Example of documents classified here: US2004179627 (figure 3):
H04B 7/0426
Power distribution

References
Informative references
Attention is drawn to the following places, which may be of interest for search:

Power control in diversity systems

H04B 7/0491
using two or more sectors, i.e. sector diversity

Definition statement
This place covers:
Example of document classified here: see e.g. US2008004016 (abstract): "A base station for establishing a picocell is configured so as to provide multiple sectors, with spatial diversity between sectors. The combination of the multiple sectors and the spatial diversity reduces signal power requirements in the air interface within a confined space and provides improvements in quality of service."

H04B 7/06
at the transmitting station

Definition statement
This place covers:
Plurality of spaced independent aerials at the transmitter (correlated or uncorrelated)

References
Limiting references
This place does not cover:

Mimo systems

H04B 7/0602
{using antenna switching (H04B 7/0686 takes precedence; antenna beam directivity switching H01Q 3/24)}

References
Limiting references
This place does not cover:

Hybrid systems, i.e. switching and simultaneous transmission
Informative references
Attention is drawn to the following places, which may be of interest for search:

| Antenna beam directivity switching | H01Q 3/24 |

Special rules of classification
H04B 7/0686 takes precedence.

H04B 7/0619
{using feedback from receiving side (feedback signaling for adaptive modulation/coding H04L 1/0001)}

References

Limiting references
This place does not cover:

| Feedback signalling for adaptive modulation and coding | H04L 1/0001 |
**H04B 7/0641**

{Differential feedback}

**Definition statement**

*This place covers:*

Example of documents classified in this group: see e.g. WO2008157620 (fig. 2 and paragraph [0031]):

---

**H04B 7/065**

{Variable contents, e.g. long-term or short-short}

**Definition statement**

*This place covers:*

Example of document classified here: see e.g. WO2008157620 (fig. 2 and paragraph [0031]).
H04B 7/0654

{at the receiver, e.g. antenna verification at mobile station}

Definition statement

This place covers:

Example of document classified here: see US2006068791 (fig. 2, paragraph [0031]):

or abstract of Seeger A; Sikora M, "Antenna weight verification for closed loop transmit diversity, GLOBECOM'03. 2003 - IEEE GLOBAL TELECOMMUNICATIONS CONFERENCE. CONFERENCE PROCEEDINGS. SAN FRANCISCO, CA, DEC. 1 - 5, 2003; [IEEE GLOBAL TELECOMMUNICATIONS CONFERENCE], 20031201; 20031201 - 20031205, NEW YORK, NY : IEEE, US, XP010678496: "Closed loop transmit diversity (CLTD) for FDD WCDMA relies on low-rate feedback to achieve both beamforming and diversity gain. Since the feedback channel is not immune to errors, occasionally base station (BS) uses different antenna weight vector from the one requested by mobile station (MS).

Surprisingly, most of the resulting performance degradation is caused not by reduced power of the Rx signal, but by erroneous dedicated channel estimation at the MS relying on knowledge of used weight vector. In this paper we introduce a general trellisbased antenna weight verification algorithm, which attempts to detect feedback errors and determine the most likely weight vector."
H04B 7/0656
{at the transmitter, e.g. error detection at base station}

Definition statement
This place covers:
For example error detection/correction of feedback bits at diversity transmitter.

H04B 7/0663
{using vector or matrix manipulations}

Definition statement
This place covers:
Example of document classified here: see US2006056531 (abstract): "Feedback bandwidth may be reduced in a closed loop MIMO system by Householder transformations, vector quantization using codebooks, and down-sampling in the frequency domain. A column of a beamforming matrix is quantized using a codebook, a Householder reflection is performed on the beamforming matrix to reduce the dimensionality of the beamforming matrix, and the quantizing and performing of Householder reflection on the previously dimensionality reduced beamforming matrix is recursively repeated to obtain a further reduction of dimensionality of the beamforming matrix."

H04B 7/0669
{using different channel coding between antennas (space-time coding H04L 1/0618)}

References
Limiting references
This place does not cover:

| Space-time coding | H04L 1/0618 |
H04B 7/0671
{using different delays between antennas}

Definition statement
This place covers:
Example of document classified here: see WO0011806 (abstract and figure 1):

H04B 7/0678
{using different spreading codes between antennas (code allocation H04J 13/16)}

References
Limiting references
This place does not cover:

<table>
<thead>
<tr>
<th>Code allocation</th>
<th>H04J 13/16</th>
</tr>
</thead>
</table>

FIG.1 PRIOR ART

![Diagram](image-url)
H04B 7/068
{using space frequency diversity (space-frequency coding H04L 1/0606)}

References

Limiting references

This place does not cover:

| Space-frequency coding | H04L 1/0606 |

H04B 7/0682
{using phase diversity (e.g. phase sweeping)}

Definition statement

This place covers:

Example of documents classified here: see US2006172710 (abstract) for phase sweeping diversity.
H04B 7/0689

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

Definition statement

This place covers:

Example of document classified here: see e.g. EP2276305 (figure 5):
H04B 7/0697
{using spatial multiplexing}

**Definition statement**

*This place covers:*

Example of document classified here: see e.g. US2003235147:

---

**FIG. 4**

---

H04B 7/08

at the receiving station

**Definition statement**

*This place covers:*

Plurality of spaced independent aerials at the receiver (correlated or uncorrelated).
References

Limiting references

This place does not cover:

| Mimo systems                                      | H04B 7/0413 |

H04B 7/0802

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

References

Limiting references

This place does not cover:

| Hybrid systems, i.e switching and combining       | H04B 7/0868 |
| Antenna beam directivity switching                | H01Q 3/24   |

H04B 7/0805

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

Definition statement

This place covers:

Example of documents classified here for receive antennas switched to a single receiver circuit; see US2010075603 (figure 1):
References

Limiting references

This place does not cover:

- according to predefined selection scheme

**H04B 7/0817**

{with multiple receivers and antenna path selection}

Definition statement

This place covers:

Example of document classified here: where the selection criterion is not necessarily identified, see WO2008003029 (figure 1):

![Diagram](image)

**H04B 7/0837**

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

References

Limiting references

This place does not cover:

- Hybrid systems, i.e. switching and combining
H04B 7/084

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

References

Limiting references
This place does not cover:

| Antenna beam scanning or forming by phase or amplitude control; phased arrays | H01Q 3/26 |

H04B 7/0845

{per branch equalization, e.g. by an FIR-filter or RAKE receiver per antenna branch (rares receivers as such H04B 1/7115)}

Definition statement
This place covers:

Example of documents classified here: see US2009097577 (figure 1):

References

Limiting references
This place does not cover:

| Rake receivers as such | H04B 1/7115 |
H04B 7/0851
{using training sequences or error signal (minimizing error signal H04B 7/0854)}

Definition statement
This place covers:
Example of documents classified here: see US6115406 (figure 5):

References
Limiting references
This place does not cover:

Minimizing error signal

| Minimizing error signal | H04B 7/0854 |
H04B 7/086
{using weights depending on external parameters, e.g. direction of arrival (DOA), predetermined weights or beamforming}

Definition statement
This place covers:
Beamforming at the receiver included here.

H04B 7/0882
{using post-detection diversity}

Definition statement
This place covers:
Example of documents classified here: see EP1257070 (figure 1):

---

H04B 7/0891
{Space-time diversity (rake receivers H04B 1/7115; space-time decoding H04L 1/0631)}

References

Limiting references
This place does not cover:

<table>
<thead>
<tr>
<th>Rake receivers</th>
<th>H04B 1/7115</th>
</tr>
</thead>
<tbody>
<tr>
<td>Space-time coding</td>
<td>H04L 1/0631</td>
</tr>
</tbody>
</table>
H04B 7/0897
{using beamforming per multi-path, e.g. to cope with different directions of arrival [DOA] at different multi-paths}

Glossary of terms
In this place, the following terms or expressions are used with the meaning indicated:

<table>
<thead>
<tr>
<th>Term</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sdma</td>
<td>Space Division Multiple Access</td>
</tr>
</tbody>
</table>

H04B 7/14
Relay systems

Definition statement
This place covers:

Radio relay systems are divided into passive relay systems (H04B 7/145) and active relay systems (H04B 7/15).

A passive relay is a relay on which a signal is only reflected.

Active relay systems are used by communication arrangements to receive, to process and to retransmit signals between devices separated by air or space.

Mobility is possible between the devices of the active relay system and the transmission can be unidirectional or bidirectional.

The processing within the relay is of a wide range. For instance the relay processing covers the following issues. The signals relayed can be a multiplex of a plurality of signals. The processing minimizes the interference between the signal received and retransmitted. Signal are regenerated, signals are switched in the relay before retransmission. Further processing details are indicated in the subgroups of H04B 7/15.

Moreover, as indicated below, the active relay systems are further subdivided into ground based relay stations, airborne relay stations and space based relay station (satellites).

Relationships with other classification places

<table>
<thead>
<tr>
<th>Classification</th>
<th>CPC Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broadcast communication</td>
<td>H04H</td>
</tr>
<tr>
<td>Multiplexing</td>
<td>H04J</td>
</tr>
<tr>
<td>Telephony</td>
<td>H04M</td>
</tr>
<tr>
<td>Wireless communication networks</td>
<td>H04W</td>
</tr>
</tbody>
</table>

References

Limiting references
This place does not cover:

<table>
<thead>
<tr>
<th>Classification</th>
<th>CPC Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repeater in line transmission systems</td>
<td>H04B 3/36</td>
</tr>
<tr>
<td>Repeater in transmission systems employing waves other than radio waves</td>
<td>H04B 10/29, H04B 10/291</td>
</tr>
<tr>
<td>Cosmonautic vehicle (e.g. satellite per se)</td>
<td>B64G 1/00</td>
</tr>
</tbody>
</table>
### Limiting references

<table>
<thead>
<tr>
<th>_topic</th>
<th>CPC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geolocalisation</td>
<td>G01S 5/00</td>
</tr>
<tr>
<td>Interrogator-responder</td>
<td>G01S 13/00</td>
</tr>
<tr>
<td>Aircraft piloting</td>
<td>G05D 1/00</td>
</tr>
<tr>
<td>Traffic control for aircraft</td>
<td>G08G 5/00</td>
</tr>
<tr>
<td>Antenna orientation</td>
<td>H01Q 3/00</td>
</tr>
<tr>
<td>Details of amplifier gain control</td>
<td>H03G 3/00</td>
</tr>
<tr>
<td>Details of error protection techniques processed in relay station</td>
<td>H04L 1/00</td>
</tr>
<tr>
<td>Details of modulation techniques processed in relay station</td>
<td>H04L 27/00</td>
</tr>
<tr>
<td>Metering arrangements</td>
<td>H04M 15/00</td>
</tr>
<tr>
<td>Network planning: Network coordinated processing with regard to cell extension</td>
<td>H04W 16/26</td>
</tr>
<tr>
<td>Details of wireless communication routing</td>
<td>H04W 40/00</td>
</tr>
<tr>
<td>Generic documents concerning resource allocation e.g. time, frequency and/or codes</td>
<td>H04W 72/04, H04L 5/00, H04J 13/00</td>
</tr>
<tr>
<td>Wireless communication terminal adapted for relaying to or from other wireless communication terminal</td>
<td>H04W 88/04</td>
</tr>
</tbody>
</table>

### Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

<table>
<thead>
<tr>
<th>_topic</th>
<th>CPC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerial array</td>
<td>H01Q 21/00</td>
</tr>
<tr>
<td>Catv (Community Antenna Television) systems</td>
<td>H04H 20/78</td>
</tr>
<tr>
<td>Broadcast receiver</td>
<td>H04H 40/00</td>
</tr>
<tr>
<td>Multiplexing</td>
<td>H04L 5/00</td>
</tr>
<tr>
<td>Synchronisation of receiver with transmitter</td>
<td>H04L 7/00</td>
</tr>
<tr>
<td>Television systems</td>
<td>H04N 7/00</td>
</tr>
<tr>
<td>Relay systems adapted for television</td>
<td>H04N 7/20</td>
</tr>
<tr>
<td>Selective content distribution</td>
<td>H04N 21/00</td>
</tr>
</tbody>
</table>

### Informative references

Attention is drawn to the following places, which may be of interest for search:

<table>
<thead>
<tr>
<th>_topic</th>
<th>CPC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diversity systems</td>
<td>H04B 7/02</td>
</tr>
<tr>
<td>Scatter propagation systems</td>
<td>H04B 7/22</td>
</tr>
<tr>
<td>Broadcast systems</td>
<td>H04H 20/00</td>
</tr>
<tr>
<td>Secret and secure communications</td>
<td>H04L 9/00</td>
</tr>
<tr>
<td>Data switching networks</td>
<td>H04L 12/00</td>
</tr>
<tr>
<td>Protocols in data network</td>
<td>H04L 29/06</td>
</tr>
<tr>
<td>Synchronization in wireless networks</td>
<td>H04W 56/00</td>
</tr>
</tbody>
</table>
H04B 7/145
Passive relay systems

Definition statement
This place covers:
A passive relay is a relay on which a signal is only reflected. No processing is done by such a relay. A passive relay is used to scatter a signal.

Radio waves, below a certain frequency, are reflected by the ionosphere. This allows propagation beyond the horizon.

Meteor burst communication or meteor scatter communication uses the ionized trail of a meteor for radio wave reflection.

Two antennas linked by a waveguide assure radio relaying. This is used for example to allow reception in a tunnel.

Reflection can be achieved by the use of a passive airborne platform.

To enable radio wave transmission in buildings, passive antennas, material transparent to radio waves ... are used.

References
Limiting references
This place does not cover:

| Construction of passive reflectors | G01S 13/75 |

H04B 7/155
Ground-based stations (H04B 7/204 takes precedence)

Definition statement
This place covers:
Relays are used for range extension, to cover shadowed regions, to allow communication with the inside of a building, to transmit signals over long distances.

Microwaves relays working from 2 to 5 GHz with fixed stations in line of sight allow point to point high data rate transmission for telephony or broadcasting signals.

Shortwave relay are used for broadcasting.

Relays are used in a wireless network for radio cell extension.

Cooperative relays are used for signals diversity.

References
Limiting references
This place does not cover:

| Multiple access | H04B 7/204 |
Informative references
Attention is drawn to the following places, which may be of interest for search:

| Ground-based stations for satellite systems | H04B 7/18517 |

Special rules of classification
H04B 7/204 takes precedence

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 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)}

References
Limiting references
This place does not cover:

| Network topologies using dedicated repeater stations | H04W 84/047 |

H04B 7/15514

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

References
Limiting references
This place does not cover:

| Shadowing compensation for satellite mobile telephony service systems | H04B 7/18536 |

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 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)}

References
Limiting references
This place does not cover:

| Network coding aspects for detection or prevention of errors in the information received | H04L 1/0076 |
Network traffic management with optimizing information sizing e.g. header compression, by using assembly and disassembly of packets

**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**)}

**References**

**Limiting references**

*This place does not cover:*

| Gain control to reduce self- or loop interference | H04B 7/15578 |
| Amplifier gain control in general, | H03G 3/00 |

**H04B 7/15542**

{Selecting at relay station its transmit and receive resources (selection of wireless resources by user or terminal **H04W 72/02**; arrangements affording multiple use of the transmission path by two-dimensional division of the resources **H04L 5/0003**, or by allocating sub-channels **H04L 5/003**)}

**References**

**Limiting references**

*This place does not cover:*

| Arrangements affording multiple use of the transmission path by two dimensional division of the resources or by allocating subchannels | H04L 5/0003, H04L 5/003 |
| Selection of wireless resources by user or user terminal | H04W 72/02 |

**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**)}

**References**

**Limiting references**

*This place does not cover:*

| cooperative diversity | H04B 7/026 |

**H04B 7/165**

employing angle modulation

**Special rules of classification**

Group for consultation only. Documents are classified in **H04B 7/15564**.
**H04B 7/17**

employing pulse modulation, e.g. pulse code modulation

**Special rules of classification**

Group for consultation only. Documents are classified in **H04B 7/15564**.

**H04B 7/185**

Space-based or airborne stations; {Stations for satellite systems} (**H04B 7/204** takes precedence)

**Special rules of classification**

**H04B 7/204** takes precedence.

**H04B 7/18504**

{Aircraft used as relay or high altitude atmospheric platform}

**Definition statement**

*This place covers:*

The stations are navigating in the stratosphere (below 50 km).

The airborne station is an unmanned airborne device or an aircraft covering a region (for example in case of an emergency situation when communications are disrupted during a catastrophically event). The relay is a lighter than air device, a balloon, a dirigible, a device called HALE (High Altitude Low Expenditure), HAAP (High Altitude Atmospheric Platform), SHARP (Stationary High Altitude Relay Platform) or an unmanned aerial vehicle (UAV).

The airborne station works alone or is part of a network of other stations. The communications can then be handed over to another platform. A satellite can be part of the network. The technical characteristics of these devices, their trajectory are adapted for communication. The relays are drifting in the sky or they are stabilized in position and altitude.

**H04B 7/18506**

{Communications with or from aircraft, i.e. aeronautical mobile service}

**Definition statement**

*This place covers:*

Communications with or from an aircraft without relaying through a satellite.

The system are communication systems for commercial aircrafts and used for transmission between the passengers and the ground for voice or data communication. The systems are as well for communications between the cockpit and earth control stations for air traffic control, for aircraft short messages service …

Such systems are as well used for transport devices like a bus or ship.

The communications are multiplexed on the up and down link and must be demultiplexed. Antenna aspects in such systems.

A network of ground stations is necessary to follow the aircraft. A call is handed over between ground stations.
A network can be established between aircrafts. Other aircrafts must be localized.

The aircraft flies over regions with different ground systems and regulations

A communication network exists on board allowing on board broadcasting to the passengers or communications between users and the crew. Data transmission for in-flight entertainment, for use of Internet.

The aircraft can be equipped with terminals or the user can use his own voice or data terminal. Security. The use of a terminal is potentially dangerous because of its radiations.

A user on board of an aircraft must be localized by the ground system to establish the link and for billing.

Communication equipment and specific aircraft devices like navigation apparatuses are integrated on board. Relaying toward earth of aircraft sensor values.

**H04B 7/18508**

*{with satellite system used as relay, i.e. aeronautical mobile satellite service}*

**Definition statement**

This place covers:

Communications with or from an aircraft with relaying through a satellite for commercial aircrafts and for communications between the cockpit and earth control. Systems for aircrafts and for devices like a bus or ship.

The communication aspects covered are identical as for H04B 7/18506 but at least one satellite is involved in the aircraft-ground link.

Use of geostationary satellites or not. Localisation of the satellites by the aircraft.

Handover between satellites.

The antennas of the aircraft are oriented towards the satellite.

The transmission delay is increased with use of a satellite.

Particular application: video broadcasting.

**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 - H04B 7/18576)*}

**Definition statement**

This place covers:

Satellites are used for relaying communications.

Satellite systems for varied applications exit. Communication aspects for such systems. Satellite applications can be: earth observation, weather forecast data transmission, emergency calls, fleet tracking, space based radar, aircraft guidance and navigation, navigation systems using satellites, land observing satellites.

**Special rules of classification**

H04B 7/18508, H04B 7/18521 take precedence.
For providing specific services H04B 7/18523 - H04B 7/18576

H04B 7/18513

{Transmission in a satellite or space-based system}

**Definition statement**

*This place covers:*

All aspects relating to communications in uplink and downlink in a satellite system such as:

- Feeder link and user link.
- Frequency allocation. Frequency sharing and reuse. Frequency hopping.

H04B 7/18515

{Transmission equipment in satellites or space-based relays}

**Definition statement**

*This place covers:*

Equipment on board of the satellite. Telecommunication payload, bus and platform equipments.

All equipment on-board involved in transmission such as: transponder, amplifier, multiplexer, demultiplexer, on-board digital processors, antennas.

H04B 7/18517

{Transmission equipment in earth stations}

**Definition statement**

*This place covers:*

All equipments used in earth-based stations.

These stations can be: a hub station, a control station, a gateway, a user terminal, a Small Aperture Terminal.

H04B 7/18519

{Operations control, administration or maintenance}

**Definition statement**

*This place covers:*


Monitoring, control, telemetry.

Satellite attitude and orbital control to optimize communication performance.
System simulation.

**H04B 7/18521**

*{Systems of inter linked satellites, i.e. inter satellite service (for optical links between satellites H04B 10/118)}*

**Definition statement**

*This place covers:*

The link between satellites can be radio or optical.

Constellation of satellites with inter-satellite links to route a communication through the network of satellites.

**References**

**Limiting references**

*This place does not cover:*

| Optical links between satellites | H04B 10/118 |

**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)}*

**Definition statement**

*This place covers:*

Simulcast (simultaneous broadcasting). Multicasting (transmission to a group of users). Geocast (transmission to geographic areas).

Feedback from the user (thru satellite or thru terrestrial network) for interactive system.

On-board transponders.

**Relationships with other classification places**

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<thead>
<tr>
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<td>Receiving picture transmission via satellite</td>
<td>H04N 1/00103</td>
</tr>
<tr>
<td>Television transmission via satellite</td>
<td>H04N 7/20</td>
</tr>
</tbody>
</table>

**Special rules of classification**

This group in not used if the satellite is transparent to the broadcast service.
H04B 7/18526
{Arrangements for data linking, networking or transporting, or for controlling an end to end session (data switching networks H04L 12/00)}

References

Limiting references
This place does not cover:

| 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}

Definition statement
This place covers:
Mainly for Very Small Aperture Terminal (VSAT) system.
Fixed satellite service. for telephony, telecommunication and data communication.
The satellites used are geostationary, geosynchronous.

H04B 7/18532
{Arrangements for managing transmission, i.e. for transporting data or a signalling message}

Definition statement
This place covers:
Transport of data or signalling messages. Transport of voice channels.
Traffic channels, dedicated control channels, broadcast channels, paging channels, beacon signal, pilot channels, synchronisation channels.
Spot beams antennas for creation of communication cells.

H04B 7/18534
{for enhancing link reliability, e.g. satellites diversity}

Definition statement
This place covers:
In particular for diversity used to increase link quality.
Resources seamlessly added or subtracted.
Transmission with multidirectional antennas from the base station to achieve diversity.
H04B 7/18536

{Shadowing compensation therefor, e.g. by using an additional terrestrial relay}

Definition statement

This place covers:
Shadowing due to blockage of signals. Use of an additional terrestrial relay or other techniques.

H04B 7/18539

{Arrangements for managing radio, resources, i.e. for establishing or releasing a connection}

Definition statement

This place covers:
Allocation of radio resources for establishing or releasing a connection.
Resource allocation for load balancing.
Determination and dissemination of information through the network of gateway for resource planning.
Frequency planning.
Frequency attributed according to need, to a reuse pattern, to limit interference.
Power control in real and non real time.
Time slot allocation.
Channel allocation: fixed, borrowed, dynamic.

H04B 7/18541

{for handover of resources}

Definition statement

This place covers:
A communication is handed over from one satellite to another according to the satellites rotations.
Handoff beam to beam, satellite to satellite, frequency to frequency.
Network controlled handover, mobile controlled handover, mobile assisted handover.

H04B 7/18543

{for adaptation of transmission parameters, e.g. power control (for detecting or preventing errors in the information received H04L 1/00)}

References

Limiting references

This place does not cover:
Detecting or preventing errors in the information received

| 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}

**Definition statement**

*This place covers:*

Terminal registration process. Local or global registration.

Location update of terminal.

Registration in a local and global database with user identification and position.

Re-registration. Periodic registration of a mobile, registration after loss of a signal (outage), terminal unavailability.

**H04B 7/18547**

{for geolocalisation of a station (position fixing by direction or distance determination G01S 5/00)}

**Definition statement**

*This place covers:*

Geolocalisation of a user for radio localisation, call barring, call billing, synchronisation.

**References**

**Limiting references**

*This place does not cover:*

| 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}

**Definition statement**

*This place covers:*

Measure of propagation delay variation, Doppler frequency variation, power variation, beam identification.

Measure of time delay satellite-user.
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)}

References

Limiting references

This place does not cover:

Determining absolute distances from a plurality of spaced points of known location G01S 5/14

H04B 7/1856

{for call routing}

Definition statement

This place covers:
Routing through terrestrial network with only node-satellite-terminal links.

Mobile to mobile call.

Mobile to fixed, fixed to mobile call.

Routing tables used are changed according to network topology (link usage, congestion, failure, shutdown).

Optimization of transmission path (minimum hop route, packet delay).

Satellite in relation with more than one node for control.

H04B 7/18563

{Arrangements for interconnecting multiple systems (data switching networks H04L 12/00)}

Definition statement

This place covers:
Use of a terrestrial and a satellite system (dual mode).

Protocol conversion between different satellites, terrestrial systems.

Use of a terminal adapted for the two systems. Characteristics differ: antenna used (orientation), power transmitted (higher for a satellite system, user head protection).
H04B 7/18565
{Arrangements for preventing unauthorised access or for providing user protection (arrangements for secret or secure communication H04L 9/00)}

References
Limiting references
This place does not cover:

| Arrangements for secret or secure communication | H04L 9/00 |

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)}

Definition statement
This place covers:
Use of a minisatellite, a microsatellite. Miniaturized satellites. Milli, micro, nano, picosatellites.
Little LEO. Smaller low cost satellites on a low earth orbit.
Satellite formation flying, trailing formation, cluster formation.
Fractionated spacecraft.
Systems for data, asset or vehicle tracking, messaging, emergency, alert services, disaster, medicine, education, data acquisition, meter reading, e-mail, fax, store and forward messaging.
Terminals adapted to system function.

H04B 7/18578
{Satellite systems for providing broadband data service to individual earth stations (for selecting H04W; provisions for broadband connection, H04Q 11/0478)}

Definition statement
This place covers:
Data communication for users which can be mobile using a satellite as relay between the user and a control station. The data transported are of large band.

References
Limiting references
This place does not cover:

| Provisions for broadband connection | H04Q 11/0478 |
H04B 7/1858
{Arrangements for data transmission on the physical system, i.e. for data bit transmission between network components}

Definition statement

This place covers:
Description of the transmission equipments of the system. Satellite, terminal and control station.
Description of the transport of the information. Modulation, demodulation, antenna, radio link between earth and satellite, bit synchronisation.

H04B 7/18582
{Arrangements for data linking, i.e. for data framing, for error recovery, for multiple access}

Definition statement

This place covers:
Construction of the frame, preamble, multiplexing, demultiplexing, TDMA, CDMA, FDMA, frequency hopping, frame synchronisation, error control (ARQ, FEC), data packet queuing or scheduling.

H04B 7/18586
{Arrangements for data transporting, e.g. for an end to end data transport or check}

Definition statement

This place covers:
Segmentation and reassembly.
Connection oriented, connectionless communication. Establishment of the physical links.
Transport of bits, bytes, packets.
Multiplexing, demultiplexing on a single link.
Congestion control. Flow control.
Fiability of the transport.
Error detection and recovery (forward error correction, repetition, automatic repetition).

H04B 7/18593
{Arrangements for preventing unauthorised access or for providing user protection (arrangements for secret or secure communication H04L 9/00)}

Definition statement

This place covers:
References

Limiting references

This place does not cover:

| Arrangements for secret or secure communication | H04L 9/00 |

H04B 7/19

Earth-synchronous stations

Definition statement

This place covers:

The satellite is on a geostationary, an equatorial, a geosynchronous orbit or semi-synchronous orbit.

Description of the constellation of satellites, of the orbital parameters.

H04B 7/195

Non-synchronous stations

Definition statement

This place covers:

The orbits are low earth orbit (LEO), medium earth orbit (MEO) or high earth orbit (HEO) according to the altitude of the satellite. Mixed constellation.

Inclined orbit, polar orbit, sun synchronous orbit, circular orbit, elliptical orbit, Molnia, Tundra.

H04B 7/204

Multiple access

Definition statement

This place covers:

On board of a satellite.

Special rules of classification

Group for consultation only. Documents are classified in H04B 7/18515.

H04B 7/2041

{Spot beam multiple access}

Definition statement

This place covers:

On board of a satellite.


References

Informative references
Attention is drawn to the following places, which may be of interest for search:

| Satellite on board equipment. | H04B 7/18515 |

H04B 7/2043
{Mixed mode, TDM and FDM systems}

Definition statement
This place covers:
On board of a satellite.

Special rules of classification
Group for consultation only. Documents are classified in H04B 7/18515.

H04B 7/2045
{SS-FDMA, FDMA satellite switching}

Definition statement
This place covers:
On board of a satellite.

Special rules of classification
Group for consultation only. Documents are classified in H04B 7/18515.

H04B 7/2046
{SS-TDMA, TDMA satellite switching}

Definition statement
This place covers:
On board of a satellite.

Special rules of classification
Group for consultation only. Documents are classified in H04B 7/18515.

H04B 7/2048
{Frame structure, synchronisation or frame acquisition in SS-TDMA systems}

Definition statement
This place covers:
On board of a satellite.

Special rules of classification
Group for consultation only. Documents are classified in H04B 7/18515.
**H04B 7/208**

**Frequency-division multiple access ([FDMA])**

**Definition statement**

*This place covers:*

On board of a satellite.

**Special rules of classification**

Group for consultation only. Documents are classified in H04B 7/18515.

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**H04B 7/212**

**Time-division multiple access ([TDMA])**

**Definition statement**

*This place covers:*

On board of a satellite.

**Special rules of classification**

Group for consultation only. Documents are classified in H04B 7/18515.

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**H04B 7/2121**

*{Channels assignment to the different stations}*

**Definition statement**

*This place covers:*

On board of a satellite.

**Special rules of classification**

Group for consultation only. Documents are classified in H04B 7/18515.

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**H04B 7/2123**

*{Variable assignment, e.g. demand assignment}*

**Definition statement**

*This place covers:*

On board of a satellite.

**Special rules of classification**

Group for consultation only. Documents are classified in H04B 7/18515.
H04B 7/2125
{Synchronisation}

Definition statement
This place covers:
On board of a satellite.

H04B 7/2126
{using a reference station}

Definition statement
This place covers:
On board of a satellite.

Special rules of classification
Group for consultation only. Documents are classified in H04B 7/18515.

H04B 7/2128
{Changing of the reference station}

Definition statement
This place covers:
On board of a satellite.

Special rules of classification
Group for consultation only. Documents are classified in H04B 7/18515.

H04B 7/216
Code division or spread-spectrum multiple access {CDMA, SSMA}

Definition statement
This place covers:
On board of a satellite.

References
Informative references
Attention is drawn to the following places, which may be of interest for search:

| Spread spectrum techniques in general | H04B 1/69 |

Special rules of classification
Group for consultation only. Documents are classified in H04B 7/18515.
**H04B 7/22**

Scatter propagation systems {, e.g. ionospheric, tropospheric or meteor scatter}

**Definition statement**

*This place covers:*

Use of ionosphere, troposphere reflexion or meteor scatter.

In such systems, the radio propagation is not a line of sight propagation between two devices. The signals are reflected, refracted or scattered by natural components of the earth atmosphere. A network using such reflexions and the radio link between the divers network components are described. Passive relay are described in **H04B 7/145**.

Radio waves are refracted by the ionized layers of the upper atmosphere. These layers are influenced by the sun. Such communications are used for amateur radio, marine and aircraft communications, shortwave broadcast.

Tropospheric scatter is a method of communication in which signals at particular frequencies are randomly scattered by the upper layers of the troposphere allowing the transmission of signals on a distance of hundred of kilometres. Only a small amount of the transmitted power is received. A narrow frequency band is generally used.

A meteor burst communication system uses the ionized meteor trails as radio reflector between two stations. These trails exit at an altitude of approximately 100 km and allow a long range, low data rate intermittent communication of a few seconds on a distance of 2000 km.

Auroral ionization, rain, lightning can create scattering.

**References**

**Limiting references**

*This place does not cover:*

<table>
<thead>
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</table>

**Informative references**

*Attention is drawn to the following places, which may be of interest for search:*

<table>
<thead>
<tr>
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</table>

**H04B 7/24**

for communication between two or more posts (wireless communication networks **H04W**)

**Definition statement**

*This place covers:*

In a communication network, the physical link and the signals transmitted between the divers network components are described. The link can be wired or wireless, the network components are fixed in this head group, mobile in the different sub-groups.

Transmission medium: twisted pairs, copper wires, coaxial cable, air ...
Nature of information transmitted: voice, video, data ...

Description of the signal to be transmitted: analogue, digital transmission, analogue/digital conversion, voice codec.

Coding of the signal, PCM, line codes (NRZ, unipolar, bipolar, Manchester encoding...).

Modulation used (QPSK, PSK, QAM, FSK, PSK, ASK). Amplitude, phase, frequency modulation.


Description of the network: star, mesh, ring network.

References

Limiting references

This place does not cover:

| Relay systems | H04B 7/14 |
| Wireless systems | H04W |

Informative references

Attention is drawn to the following places, which may be of interest for search:

| Spread spectrum communications | H04B 1/69 |
| Equalisation | H04B 7/005 |
| Diversity system | H04B 7/02 |
| Scatter propagation system | H04B 7/22 |
| Broadcast systems | H04H 20/00 |
| Time Division Multiplex communication | H04J 3/00 |
| Error protection | H04L 1/00 |
| Multiplexing | H04L 5/00 |
| Synchronisation | H04L 7/00 |
| Secret and secure communications | H04L 9/00 |
| Data switching networks | H04L 12/00 |
| Modulation | H04L 27/00 |
| Protocol in data network | H04L 29/06 |
| Synchronization in wireless networks | H04W 56/00 |
H04B 7/26
at least one of which is mobile

Definition statement
This place covers:
In a wireless communication network, the radio link, called air interface, between the divers network components is described.

Different mobile systems exist. For example: cordless telephony is a short range system.

The mobile telephony has evolved toward cellular telecommunication systems for voice, narrowband or broadband data transmission.

Relationships with other classification places
The physical channel, channel access procedures and multiple access are the lower levels of the transmission system linking users and are the object of these groups. The higher levels control the flow of messages between the network components and allow the building up of a communication and are the subject of H04W in general.

H04B 7/2603
{Arrangements for wireless physical layer control (H04B 7/2612 takes precedence)}

Definition statement
This place covers:
The signals transmitted on the air interface and the apparatuses therefore are described.

The frequency band or time interval allocated is separated in physical wireless channels.

Definition of the physical and logical channels, mapping of the logical channels on the physical channels. Logical channels for traffic of voice or data. Logical channels for control: dedicated control channels, broadcast channels, paging channels, access grant logical channels, random access channels, pilot channels, synchronisation channels ... Frequencies, time slots used, number of bits, format, overhead bits, preamble, guard periods ...

Emission: digitization, source coding, interleaving, ciphering, burst formatting, modulation. BPSK, QAM, hierarchical modulation.

Transmission: path loss, multipath fading, noise, interference, error and error correction (equalisation, error correction codes, interleaving ...).

Reception: source decoding, channel decoding, desinterleaving, deciphering, burst formatting, demodulation.

Special rules of classification
H04B 7/2612 takes precedence.
**H04B 7/2606**

*{Arrangements for base station coverage control, e.g. by using relays in tunnels}*

**Definition statement**

*This place covers:*

Relays are used for linking a user equipment with a base station.

Relays for lightening dark zones. Use of relays in tunnels, in buildings, in closed environments.

Roadway communication systems.

Fixed relay, mobile relay.

Relays for cell extension.

Multiplicity of relays.

Relay selection.

Cooperative relays.

Multihop communication.

Use of multiple antennas. Antenna characteristics, antenna patterns, spacing of antennas.

Relay functionality and design. Half-duplex, full duplex repeater. TDD (Time Division Duplex), frequency change, frequency selective repeaters, amplify and forward, decode and forward repeaters. Loop-back interference cancellation. Signal delay. Link with the base station, link with a user equipment. Protocols implemented in the relay.

**H04B 7/2612**

*{Arrangements for wireless medium access control, e.g. by allocating physical layer transmission capacity (H04B 7/2615 - H04B 7/2643 take precedence; provision for broadband connection H04Q 11/0478)}*

**Definition statement**

*This place covers:*

Allocation of a physical layer transmission capacity.

Transport channels for carrying the logical channels.

Channel access control mechanisms.

Error recovery, ARQ (Automatic Repeat Request).

Multiplexing/demultiplexing techniques such as: random access protocols (ALOHA, CSMA; CSMA/CD), fixed assignment protocols (TDMA, FDMA, CDMA, SDMA), demand assignment protocols (polling, reservation protocols (centralized), token passing protocols (decentralized)).
References

Limiting references

This place does not cover:

| Provision for broadband connection | H04Q 11/0478 |

Special rules of classification

H04B 7/2615 - H04B 7/2643 take precedence.

H04B 7/2621

{using frequency division multiple access [FDMA] (H04B 7/2615 takes precedence)}

Definition statement

This place covers:

OFDM (Orthogonal Frequency Multiplexing).

FDD (Frequency Division Duplex).

Special rules of classification

H04B 7/2615 takes precedence.

H04B 7/2625

{using common wave}

Definition statement

This place covers:

Using a common frequency.

Single frequency network.

A network of stations broadcasting on a single frequency for example.

For DVB-T (Digital Video Broadcasting Terrestrial), DVB-H (handheld), DVB-SH (satellite handheld), DTMB (Digital Terrestrial Media Broadcasting) , DAB (Digital Audio Broadcasting), mediaflo (forward link only).

Repeaters synchronized, adaptive equalization.

Use of OFDM (Orthogonal Frequency Division Modulation), COFDM (Coded Orthogonal Frequency Division Modulation; FEC convolutional coding, time and frequency interleaving).

H04B 7/2628

{using code-division multiple access [CDMA] or spread spectrum multiple access [SSMA] (H04B 7/2618 takes precedence)}

Definition statement

This place covers:

Divers types of spread spectrum systems:
• Direct-sequence spread spectrum.
• Frequency-hopping spread spectrum.
• Time-hopping spread spectrum.
• Chirp spread-spectrum.
• Ultra wide band.

Codes used:
• Pseudo-random noise code.
• Orthogonal codes, Walsh-Hadamard codes.
• Non Orthogonal codes, shift-register sequences, M-sequences, Gold codes, Kasami codes.

Transceiver:
• Auto-correlation, cross correlation, long codes, short codes.
• Synchronous, asynchronous systems.
• Near far problem, power control.
• Code synchronization, acquisition and tracking.
• Correlator, delay lock loop, thau dither loop, extended Kalman filter.

**Special rules of classification**

*H04B 7/2618* takes precedence.

**H04B 7/2631**

{for broadband transmission}

**Definition statement**

*This place covers:*

Transmission of information on a plurality of parallel channels.

Protocols such as WCDMA (Wideband CDMA), HSPA (High Speed Packet Access).

**H04B 7/2643**

{using time-division multiple access [TDMA] (*H04B 7/2615, H04B 7/2618* take precedence)}

**Definition statement**

*This place covers:*

TDD (Time Division Duplex).

Superframes, frames, time slots.

Formats used for the frames and the time slots. Description of the burst, the information in the time slot.

Guard bands to avoid overlapping of the signals.

Preamble, training, equalisation, synchronisation, start/stop bits.

Uplink, downlink frame.

**Special rules of classification**

*H04B 7/2615, H04B 7/2618* take precedence.
H04B 7/2662
{Arrangements for Wireless System Synchronisation}

Special rules of classification
Group used for consultation only. Documents are classified in H04W 56/00.

H04B 7/2665
{Arrangements for Wireless Frequency Division Multiple Access [FDMA] System Synchronisation}

Special rules of classification
Group used for consultation only. Documents are classified in H04W 56/00.

H04B 7/2668
{Arrangements for Wireless Code-Division Multiple Access [CDMA] System Synchronisation, (for code acquisition H04B 1/7075, for code tracking H04B 1/7085)}

References

Limiting references
This place does not cover:

<table>
<thead>
<tr>
<th>Cdma code acquisition</th>
<th>H04B 1/7075</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cdma code tracking</td>
<td>H04B 1/7085</td>
</tr>
</tbody>
</table>

Special rules of classification
Group used for consultation only. Documents are classified in H04W 56/00.

H04B 7/2671
{Arrangements for Wireless Time-Division Multiple Access [TDMA] System Synchronisation}

Special rules of classification
Group used for consultation only. Documents are classified in H04W 56/00.

H04B 7/2675
{Frequency synchronisation}

Special rules of classification
Group used for consultation only. Documents are classified in H04W 56/00.
H04B 7/2678

{Time synchronisation}

Special rules of classification
Group used for consultation only. Documents are classified in H04W 56/00.

H04B 7/2681

{Synchronisation of a mobile station with one base station}

Special rules of classification
Group used for consultation only. Documents are classified in H04W 56/00.

H04B 7/2684

{Synchronisation of a mobile station with more than one base station}

Special rules of classification
Group used for consultation only. Documents are classified in H04W 56/00.

H04B 7/2687

{Inter base stations synchronisation}

Special rules of classification
Group used for consultation only. Documents are classified in H04W 56/00.

H04B 7/269

{Master/slave synchronisation}

Special rules of classification
Group used for consultation only. Documents are classified in H04W 56/00.

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}

Special rules of classification
Group used for consultation only. Documents are classified in H04W 56/00.

H04B 7/2696

{Over the air autonomous synchronisation, e.g. by monitoring network activity (H04B 7/2693 takes precedence)}

Special rules of classification
Group used for consultation only. Documents are classified in H04W 56/00.
**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

**Definition statement**

*This place covers:*
- electromagnetic waves in the optical spectrum, e.g. visible, infrared, ultraviolet
- optical corpuscular radiation, i.e. photons
- non-optical electromagnetic waves other than radio-waves, e.g. low-frequency Terahertz waves
- non-optical corpuscular radiation, i.e. beams of atomic or subatomic discrete particles

**Relationships with other classification places**

**H04B 10/00** deals with the physical layer of an optical communication system, i.e. dealing with the physical properties of the optical data signal, e.g., power, distortion, optical-electrical and electric-optical conversion of data.

**H04J 14/00** deals with the optical multiplexing layer, e.g. dealing with the optical signals as channels necessary for data transfer, e.g. routing, allocation, add-dropping, WDM networks, WDM protection.

Optical switching is covered by **H04Q 11/0001**.

Light guide arrangements as components or modules per se are classified in **G02B 6/00**, e.g. modules based on light guides for coupling, splitting, mixing, switching and dispersion compensation.

Lasers and fibre amplifiers per se are classified in **H01S** and **H01S 3/067**.

Optical devices per se for changing the optical properties of the signals based on a change in refractive index, e.g. modulators are classified in **G02F**.

**References**

**Informative references**

*Attention is drawn to the following places, which may be of interest for search:*

| Measuring characteristics of optical pulses | G01J 11/00 |
| Testing of optical devices, fibres, OTDR, | G01M 11/00 |
| Optical elements, systems or apparatus | G02B |
| Optical coupling devices, e.g. optical fibres, dispersion compensators | G02B 6/00 |
| Devices or arrangements, the optical operation of which is modified by changing the optical properties of the medium of the devices or arrangements for control of the intensity, color, phase, polarization or directing of light, e.g. switching, gating, modulating or demodulating; Frequency changing Non-linear optics; Optical analogue/digital converters | G02F |
| Optical devices that change the state (intensity, phase, polarisation) of light, e.g. modulators | G02F 1/00 |
| Wavelength converters | G02F 2/004 |
| Arrangements for handling particles or ionizing radiation e.g. focusing or moderating | G21K 1/00 |
Informative references

<table>
<thead>
<tr>
<th>Informative references</th>
<th>CPC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semiconductor devices sensitive to infrared radiation, light, electromagnetic radiation of shorter wavelength or corpuscular radiation</td>
<td>H01L 31/00</td>
</tr>
<tr>
<td>Lasers, optical amplifiers using stimulated emission</td>
<td>H01S 3/00</td>
</tr>
<tr>
<td>Semiconductor lasers</td>
<td>H01S 5/00</td>
</tr>
<tr>
<td>Time-division multiplex systems, e.g. SDH, SONET, OTN-networks</td>
<td>H04J 3/00</td>
</tr>
<tr>
<td>Optical multiplex systems</td>
<td>H04J 14/00</td>
</tr>
<tr>
<td>Optical clock recovery</td>
<td>H04L 7/00</td>
</tr>
<tr>
<td>Quantum cryptography</td>
<td>H04L 9/00</td>
</tr>
<tr>
<td>Bus networks</td>
<td>H04L 12/40</td>
</tr>
<tr>
<td>Digital modulated systems</td>
<td>H04L 27/00</td>
</tr>
<tr>
<td>Optical switching</td>
<td>H04Q 11/00</td>
</tr>
</tbody>
</table>

Special rules of classification

If appropriate, multiple classes for different technical features in the same document should be assigned

Optical - Non-optical transmission systems

Non-optical transmission systems, falling within the scope of this group, are only classified in group H04B 10/90.

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

<table>
<thead>
<tr>
<th>Station</th>
<th>head-end or subscriber network terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soliton</td>
<td>an optical pulse that does not change during propagation because of a balance between non-linear and linear effects in the fibre</td>
</tr>
<tr>
<td>Air</td>
<td>the standard gaseous mixture of nitrogen and oxygen or this mixture with varying amounts of moisture and particulate matter, enveloping the earth; the atmosphere</td>
</tr>
<tr>
<td>Fluid</td>
<td>liquid</td>
</tr>
<tr>
<td>Corpuscular radiation</td>
<td>the beams of atomic or subatomic discrete particles, e.g. photon, alpha particle, neutron, fission fragment or fissionable isotope</td>
</tr>
</tbody>
</table>

Synonyms and Keywords

In patent documents, the following abbreviations are often used:

| SMF | Single Mode Fibre |
| MMF | Multi Mode Fibre |
| CD  | Chromatic Dispersion |
| DPSK | Differential Phase Shift Keying |
| PSK  | Phase Shift Keying |
| OTDR | Optical Time Domain Reflectometry |
| OSNR | Optical Signal to Noise Ratio |
| PMD | Polarization Mode Dispersion |
RoF | Radio over Fibre
---|---
FWM | Four Wave Mixing
SPM | Self Phase Modulation
XPM | Cross Phase Modulation
ASK | Amplitude Shift Keying
FSK | Frequency Shift Keying
QAM | Quadrature Amplitude Modulation
QPSK | Quadrature PSK

**H04B 10/03**

Arrangements for fault recovery

**Definition statement**
This place covers:
Subject matter wherein a corrective action is taken to return an inoperative or malfunctioning optical communication system or its component to a satisfactory operating condition.

**References**

**Limiting references**
This place does not cover:

| Fault recovery specific to wavelength division multiplex [WDM] systems | H04J 14/02 |
| Counter-measures to a fault in digital transmission systems | H04L 29/14 |

**H04B 10/032**

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

**Definition statement**
This place covers:
Subject matter wherein the recovery is provided by a predetermined protection path in parallel with the working path that provides protection when the working path has a failure.

**References**

**Application-oriented references**
Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

| Working and protection systems specific to wavelength division multiplex [WDM] systems | H04J 14/02 |
H04B 10/035
using loopbacks

Definition statement
This place covers:
Subject matter wherein data signals are detoured in a reverse path through the network to avoid the malfunctioning component.

H04B 10/038
using bypasses

Definition statement
This place covers:
Subject matter including a provision for alternate routing around the malfunctioning component.

H04B 10/07
Arrangements for monitoring or testing transmission systems; Arrangements for fault measurement of transmission systems

Definition statement
This place covers:
Subject matter including means for monitoring, measurement or testing for evaluating an operational condition of an optical communication system or its components.

H04B 10/071
using a reflected signal, e.g. using optical time-domain reflectometers [OTDRs]

Definition statement
This place covers:
Subject matter wherein at least one communication parameter is determined by information from a signal reflected from a location in the communication network.

H04B 10/073
using an out-of-service signal (H04B 10/071 takes precedence)

Definition statement
This place covers:
Subject matter wherein the operational condition of an optical communication network or its component is tested or evaluated using an external stimulus signal while the system is not in operation.
References

Limiting references

This place does not cover:

Using a reflected signal, e.g. using optical time-domain reflectometers [OTDR]  H04B 10/071

H04B 10/075

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

Definition statement

This place covers:

Subject matter wherein the operational condition of an optical communication network or its component is tested or evaluated signal while the system is in operation.

References

Limiting references

This place does not cover:

Using a reflected signal, e.g. using optical time-domain reflectometers [OTDR]  H04B 10/071

H04B 10/077

using a supervisory or additional signal

Definition statement

This place covers:

Subject matter wherein at least one communication parameter is determined by information from a control signal provided in addition to the data signal. The additional signal can for example be modulated on the data signal or placed on a separate wavelength.

H04B 10/079

using measurements of the data signal

Definition statement

This place covers:

Subject matter wherein at least one communication parameter is determined by information derived from a measurement of the data signal, e.g. measurement of system performance parameters, e.g. OSNR, quality factor, dispersion value, power.
**H04B 10/11**

Arrangements specific to free-space transmission, i.e. transmission through air or vacuum

**Definition statement**

This place covers:
Subject matter wherein a signal-carrying optical beam is propagated such that the beam is transmitted through air or a vacuum and not spatially confined in any optical component or medium.

**References**

**Informative references**

Attention is drawn to the following places, which may be of interest for search:

| Light signal transmission through water | H04B 10/80 |

**H04B 10/112**

Line-of-sight transmission over an extended range

**Definition statement**

This place covers:
Subject matter wherein the optical beam is transmitted in a straight line to the receiver across longer distances outdoors, e.g. between buildings.

**H04B 10/1129**

{Arrangements for outdoor wireless networking of information}

**Definition statement**

This place covers:
Subject matter wherein one central station is communicating wirelessly with a plurality of terminal stations. Even if the document focuses on one such connection, but it is clear from the description and drawings it is for a network, the document should be classified here.

**H04B 10/114**

Indoor or close-range type systems

**Definition statement**

This place covers:
Subject matter wherein the optical beam is propagated between nearby apparatuses or elements within an indoor space, directly or via diffuse communication.
H04B 10/1141

{One-way transmission}

Definition statement

This place covers:
Subject-matter wherein two devices are communicating only one-way, e.g. remote controllers.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| Transmission systems for measured values or control using light, e.g, remote controls per se | G08C 23/04 |

H04B 10/1149

{Arrangements for indoor wireless networking of information}

Definition statement

This place covers:
Subject matter wherein one central station is communicating wirelessly with a plurality of terminal stations. Even if the document focuses on one such connection, but it is clear from the description and drawings it is for a network, the document should be classified here.

H04B 10/116

Visible light communication

Definition statement

This place covers:
Subject matter wherein the signal-carrying optical beam includes or consists of light having a wavelength in the visible light spectrum, e.g. a modulated lighting device or a modulated overhead light.

H04B 10/118

specially adapted for satellite communication

Definition statement

This place covers:
Subject matter wherein the optical beam is propagated to or from an Earth-orbiting object.
H04B 10/25
Arrangements specific to fibre transmission

Definition statement

This place covers:
Subject matter including one or more transparent elongated structures (e.g., rods, fibers, or pipes) which are used to transmit light waves from one point to another within the confines of their outer surface by means of internal reflections or modal transmission.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| Optical waveguides per se | G02B 6/00 |

H04B 10/2507
for the reduction or elimination of distortion or dispersion

Definition statement

This place covers:
Subject matter comprises means for correcting or reducing distortion induced by (1) scattering in a light beam as it travels along the fiber or (2) overlapping of a light signal on one wavelength onto different wavelengths because of reflected rays and different refractive indices of the optical fiber material.

H04B 10/2513
due to chromatic dispersion

Definition statement

This place covers:
Subject matter comprising means for correcting or reducing distortion that is caused by the broadening of the signal as it travels the length of the fiber.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| Dispersion compensators per se | G02B 6/29394 |
H04B 10/25133
{including a lumped electrical or optical dispersion compensator
(H04B 10/2519, H04B 10/2525 takes precedence)}

References
Limiting references
This place does not cover:

| Using Bragg gratings                          | H04B 10/2519 |
| Using dispersion-compensating fibres         | H04B 10/2525 |

Informative references
Attention is drawn to the following places, which may be of interest for search:

| Optical dispersion compensators involving optical fibres per se | G02B 6/293 |

H04B 10/2519
using Bragg gratings

Definition statement
This place covers:
Subject matter comprising means for correcting or reducing distortion caused by chromatic dispersion using a fiber Bragg grating.

References
Informative references
Attention is drawn to the following places, which may be of interest for search:

| Bragg gratings per se                              | G02B 6/02076 |
| Devices with fibre gratings for dispersion control per se | G02B 6/29316 |

H04B 10/2525
using dispersion-compensating fibres

Definition statement
This place covers:
Subject matter wherein a correction fibre of specified length and amount of dispersion is used to compensate for chromatic dispersion.

References
Informative references
Attention is drawn to the following places, which may be of interest for search:

| Dispersion-tailored and dispersion compensation fibres per se | G02B 6/02214 |
H04B 10/2525
{with dispersion management, i.e. using a combination of different kind of fibres in the transmission system}

Definition statement
This place covers:
Subject matter wherein over the whole fibre span a combination of different fibres are used to compensate for the dispersion of the span (does not cover a combination of fibres within a device)

References
Informative references
Attention is drawn to the following places, which may be of interest for search:

| Devices with different kinds of fibres for dispersion compensation per se | G02B 6/29374 |

H04B 10/2531
using spectral inversion

Definition statement
This place covers:
Subject-matter wherein dispersion is compensated through mid-span spectrum inversion.

H04B 10/2537
due to scattering processes, e.g. Raman or Brillouin scattering

Definition statement
This place covers:
Subject matter comprising means for correcting or reducing distortion caused by the interaction of the signal with molecules in the fiber.

H04B 10/2543
due to fibre non-linearities, e.g. Kerr effect

Definition statement
This place covers:
Subject matter comprising means for correcting or reducing distortion caused by variations in the optical properties of the fiber, e.g. due to the Kerr effect.

References
Informative references
Attention is drawn to the following places, which may be of interest for search:

| Devices based on non-linear optics | G02F 1/35 |
H04B 10/255
Self-phase modulation [SPM]

Definition statement

This place covers:

Subject matter comprising means for compensating for Self-phase modulation. SPM is caused by the Kerr effect which produces a variation in the refractive index of the fibre. This variation in refractive index will produce a phase shift in the pulse, leading to a change of the pulse's frequency spectrum.

H04B 10/2557
Cross-phase modulation [XPM]

Definition statement

This place covers:

Subject matter comprising means for compensating for Cross-phase modulation. XFM is caused by the Kerr effect which produces a variation in the refractive index of the fibre. This leads to one wavelength of light potentially affecting the phase of another wavelength of light.

H04B 10/2563
Four-wave mixing [FWM]

Definition statement

This place covers:

Subject matter comprising means for compensating for Four-wave mixing. FWM is an intermodulation phenomenon in optical systems; when three wavelengths interact in a nonlinear medium, they give rise to a fourth wavelength.

H04B 10/2569
due to polarisation mode dispersion [PMD]

Definition statement

This place covers:

Subject matter which comprises means for correcting or reducing distortion caused by modal dispersion where two different polarizations of light in a waveguide, which normally travel at the same speed, travel at different speeds due to random imperfections and asymmetries, causing random spreading of optical pulses.

H04B 10/2575
Radio-over-fibre, e.g. radio frequency signal modulated onto an optical carrier

Definition statement

This place covers:

RF-over-Fiber architecture, wherein a data-carrying RF (Radio Frequency) signal with a high frequency is imposed on a lightwave signal before being transported over the optical link. Wireless signals are optically distributed to base stations directly at high frequencies and converted from the optical to the electrical domain at the base stations before being amplified and radiated by an antenna.
References

Informative references
Attention is drawn to the following places, which may be of interest for search:

<table>
<thead>
<tr>
<th>Topic</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sub-carrier multiplexing</td>
<td>H04J 14/0298</td>
</tr>
</tbody>
</table>

H04B 10/25751

{Optical arrangements for CATV or video distribution (adaptations of television systems for optical transmission H04N 7/22)}

Definition statement
This place covers:
RF-over-Fiber systems used specially for CATV or video distribution

References

Limiting references
This place does not cover:

<table>
<thead>
<tr>
<th>Topic</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>adaptations of television systems for optical transmission</td>
<td>H04N 7/22</td>
</tr>
</tbody>
</table>

H04B 10/25753

{Distribution optical network, e.g. between a base station and a plurality of remote units}

References

Informative references
Attention is drawn to the following places, which may be of interest for search:

<table>
<thead>
<tr>
<th>Topic</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>WDM networks in general</td>
<td>H04J 14/0278</td>
</tr>
</tbody>
</table>

H04B 10/2581

Multimode transmission

Definition statement
This place covers:
Subject matter comprising systems using more than one mode for transmission using multimode fibres.

References

Informative references
Attention is drawn to the following places, which may be of interest for search:

<table>
<thead>
<tr>
<th>Topic</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mode multiplex systems</td>
<td>H04J 14/04</td>
</tr>
</tbody>
</table>
**H04B 10/2587**

**using a single light source for multiple stations**

**Definition statement**

*This place covers:*

Subject matter wherein the light source in a first station is used to transmit an optical data signal to at least a second station and the second station modulates the received light to transmit an optical data signal to the first station. The at least second station does not comprise a local light source.

**H04B 10/27**

**Arrangements for networking**

**Definition statement**

*This place covers:*

Subject matter wherein an optical communication system is comprised of a specific arrangement of interconnections.

**References**

**Informative references**

Attention is drawn to the following places, which may be of interest for search:

<table>
<thead>
<tr>
<th>Free-space networks</th>
<th>H04B 10/11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific to radio-over-fibre</td>
<td>H04B 10/25753</td>
</tr>
<tr>
<td>WDM networks</td>
<td>H04J 14/0278</td>
</tr>
</tbody>
</table>

**H04B 10/272**

**Star-type networks {or tree-type networks}**

**Definition statement**

*This place covers:*

Subject matter wherein an optical data distribution system contains a common node connected to one end of each of three or more branches and the other end of which is connected to each member of a local area network multiplex system to permit optical information flow between all of the members.

**H04B 10/275**

**Ring-type networks**

**Definition statement**

*This place covers:*

Subject matter wherein the local area network consists of a series of stations connected to each other and the last station is connected to the first station.
H04B 10/278

Bus-type networks

Definition statement

This place covers:

Subject matter wherein multiple optical stations are interconnected via a network of fiber optics in a bus configuration to enable transmission and reception between the stations.

H04B 10/29

Repeaters

Definition statement

This place covers:

Subject matter including apparatus for receiving a light wave signal and reradiating the signal at a same or different carrier frequency.

Note. The recreating or retransmitting signal is usually at a higher power level or in a desired direction.

Note. The information content of the transmitted signal is not changed with respect to that of the received signal.

H04B 10/291

in which processing or amplification is carried out without conversion of the main signal from optical form

Definition statement

This place covers:

Subject matter in which the optical data signal is regenerated without conversion into the electrical domain. Feedback or control signals may be converted from optical to electrical.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Fibre optical amplifiers per se H01S 3/067

H04B 10/2914

{using lumped semiconductor optical amplifiers [SOA]}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Semiconductor optical amplifiers per se H01S 5/50
H04B 10/2916
{using Raman or Brillouin amplifiers}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| Raman or Brillouin amplifiers per se | H01S 3/302 |

H04B 10/293
Signal power control

Definition statement

This place covers:
Subject matter in which the regeneration leads to a constant signal power level.

H04B 10/294
in a multiwavelength system, e.g. gain equalisation

Definition statement

This place covers:
Subject matter wherein the power control takes place in a wavelength division multiplexing [WDM] system

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| Power control in WDM systems in general | H04J 14/0221 |

H04B 10/296
Transient power control, e.g. due to channel add/drop or rapid fluctuations in the input power

Definition statement

This place covers:
Subject matter in which compensation is provided if the power of the signal changes rapidly due to changes in system parameters.
**H04B 10/297**

**Bidirectional amplification**

**Definition statement**

This place covers:

Subject matter in which the regeneration is provided using a single device that retransmits both upstream and downstream signals. The single device may contain different devices that interact with each other. A single fibre is used for upstream and downstream signals, the regeneration device can however comprise separate amplifiers for upstream and downstream signals.

**H04B 10/299**

**Signal waveform processing, e.g. reshaping or retiming**

**Definition statement**

This place covers:

Subject matter in which the shape and/or timing of the signal is processed prior to regeneration, e.g. 3R amplifiers.

**H04B 10/40**

**Transceivers**

**Definition statement**

This place covers:

Subject matter wherein an optical transmitter and a receiver are at a common location for transmission and reception of separate optical signals in such a manner that an optical signal is transmitted using some of the same equipment used for the reception of another optical signal. The optical transmitter and receiver are usually confined to a common housing in a transceiver and termed "a station".

Simultaneously operating transmitter and receiver elements that are completely separated physically are excluded from this subclass.

**H04B 10/43**

**using a single component as both light source and receiver, e.g. using a photoemitter as a photoreceiver**

**Definition statement**

This place covers:

Subject matter wherein a same diode element is used both to transmit or receive signals depending on how it is biased.

**H04B 10/50**

**Transmitters**

**Definition statement**

This place covers:

Subject matter including an opto-electric circuit for converting an information signal into a modulated optical signal suitable for propagation through or along a transmission medium. The opto-electric
circuit includes, for example, opto-electronic light sources such as LEDs, laser diode, incandescent bulbs, an optical modulator and other elements associated with fiber optic or infrared transmission system required to communicate an information signal from one location to another via an optical beam.

**H04B 10/506**

*Mutiwavelength transmitters*

**References**

*Informative references*

Attention is drawn to the following places, which may be of interest for search:

| WDM systems in general | H04J 14/02 |

**H04B 10/508**

Pulse generation, e.g. generation of solitons

**Definition statement**

*This place covers:*

Subject matter comprising details of a process in which the optical energy is transformed into pulses having a particular characteristic before information signal coding or modulation is applied to the optical energy.

**H04B 10/516**

Details of coding or modulation

**Definition statement**

*This place covers:*

Subject matter comprising details of a process in which information signal is coded into beams of optical energy by use of a carrier wave.

**H04B 10/524**

Pulse modulation

**Definition statement**

*This place covers:*

Subject matter in which modulation is produced by modulating a carrier light wave by a series of digital pulses and varying a non-amplitude attribute of the pulses (e.g., position, width) to represent information in the optical beam.

**References**

*Informative references*

Attention is drawn to the following places, which may be of interest for search:

| Intensity modulation | H04B 10/54 |
H04B 10/532
Polarisation modulation

Definition statement
This place covers:
Subject matter in which the polarization of the carrier light wave is controlled to represent information

References
Informative references
Attention is drawn to the following places, which may be of interest for search:

Polarisation multiplexed systems

H04B 10/54
Intensity modulation

Definition statement
This place covers:
Subject matter in which modulation is produced by varying the amplitude of a carrier light wave as a function of the information signal.

H04B 10/548
Phase or frequency modulation

Definition statement
This place covers:
Subject matter in which angle modulation is produced by proportionally varying the instantaneous phase angle of a sine wave carrier with the instantaneous value of an amplitude of a modulating signal, or by causing the instantaneous frequency of a sine wave carrier to depart from a carrier frequency an amount that is proportional to the instantaneous value of a modulating signal.

H04B 10/556
Digital modulation, e.g. differential phase shift keying [DPSK] or frequency shift keying [FSK]

Definition statement
This place covers:
Subject matter in which the modulation is produced by creating discrete variations of the phase or frequency of the optical signal.
H04B 10/564

Power control

Definition statement

This place covers:
Subject matter comprising details of regulating the energy level output from the transmitting laser or light emitter.

H04B 10/572

Wavelength control

Definition statement

This place covers:
Subject matter comprising details of regulating the wavelength output from the transmitting laser or light emitter. Regulating the wavelength output may include wavelength tuning or wavelength stabilization.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| Controlling the intensity, frequency, phase, polarisation or direction of the emitted radiation | H01S 3/10 |
| Arrangements for controlling the laser output parameters | H01S 5/06 |

H04B 10/58

Compensation for non-linear transmitter output

Definition statement

This place covers:
Subject matter wherein at least one output of the opto-electric circuit is modified to be an approximately linear function of its inputs. (techniques for making the output of the transmitter into a linear output)

H04B 10/588

in external modulation systems

Definition statement

This place covers:
Subject matter including particular details of varying the output of at least one laser diode element using another element outside of the laser diode to provide the optically transmitted signal.
H04B 10/60

Receivers

Definition statement

This place covers:
Subject matter including an opto-electric circuit for retrieving information from a modulated optical signal propagated through or along a transmission medium.

H04B 10/61

Coherent receivers

Definition statement

This place covers:
Subject matter wherein a received wave is combined with a locally generated wave to produce one or more beat frequency signals at the output for detection of the transmitted information signal.

References

Limiting references

This place does not cover:

<table>
<thead>
<tr>
<th>Delay line interferometer based DPSK optical receivers</th>
</tr>
</thead>
<tbody>
<tr>
<td>H04B 10/677</td>
</tr>
</tbody>
</table>

H04B 10/615

{Arrangements affecting the optical part of the receiver}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

<table>
<thead>
<tr>
<th>Use of polarisation beam splitters</th>
</tr>
</thead>
<tbody>
<tr>
<td>H04B 10/614</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Adjustment of the frequency or phase of the local oscillator in homodyne receivers</th>
</tr>
</thead>
<tbody>
<tr>
<td>H04B 10/63</td>
</tr>
</tbody>
</table>

H04B 10/6166

{Polarisation demultiplexing, tracking or alignment of orthogonal polarisation components}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

<table>
<thead>
<tr>
<th>Polarisation multiplex systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>H04J 14/06</td>
</tr>
</tbody>
</table>
**H04B 10/63**

Homodyne {, i.e. coherent receivers where the local oscillator is locked in frequency and phase to the carrier signal}

**Definition statement**

This place covers:

A receiver that demodulates the received signal by mixing it with a local oscillator signal synchronized in frequency and phase to the carrier of the received signal.

**H04B 10/64**

Heterodyne {, i.e. coherent receivers where, after the opto-electronic conversion, an electrical signal at an intermediate frequency \([f_{IF}]\) is obtained}

**Definition statement**

This place covers:

A receiver that demodulates the received signal by mixing it with a local oscillator signal having a different frequency than the carrier of the received signal.

**H04B 10/66**

Non-coherent receivers, e.g. using direct detection

**Definition statement**

This place covers:

Subject matter in which the data signal is directly converted from optical to electrical without the use of an oscillator.

**H04B 10/67**

Optical arrangements in the receiver

**Definition statement**

This place covers:

Subject matter in which the detection of the signal is enhanced by an optical arrangement in the receiver that is provided in addition to the photodetection means.

**H04B 10/69**

Electrical arrangements in the receiver

**Definition statement**

This place covers:

Subject matter in which the detection of the signal is enhanced by an electrical arrangement within the receiver that is provided in addition to the photodetection means.
**H04B 10/70**

Photonic quantum communication

**Definition statement**

*This place covers:*

Subject matter wherein characteristics of single photons are varied to represent respective bits of data and these photons are transmitted and/or received in a communication system to convey an information-bearing message.

**References**

*Limiting references*

*This place does not cover:*

Systems wherein the photons represent a cryptographic key

---

**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

**Definition statement**

*This place covers:*

Optical aspects relating to specific applications of optical communication not provided for in any of the previous subgroups, e.g. optical power feeding, optical transmission through water or rotary joints.

**References**

*Limiting references*

*This place does not cover:*

<table>
<thead>
<tr>
<th>Arrangements for fault recovery</th>
<th>H04B 10/03</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arrangements for monitoring or testing transmission systems; Arrangements for fault measurement of transmission systems</td>
<td>H04B 10/07</td>
</tr>
<tr>
<td>Arrangements specific to free-space transmission, i.e. transmission through air or vacuum</td>
<td>H04B 10/11</td>
</tr>
<tr>
<td>Arrangements specific for fibre transmission</td>
<td>H04B 10/25</td>
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<tr>
<td>Arrangements for networking</td>
<td>H04B 10/27</td>
</tr>
<tr>
<td>Repeaters</td>
<td>H04B 10/29</td>
</tr>
<tr>
<td>Transceivers</td>
<td>H04B 10/40</td>
</tr>
<tr>
<td>Transmitters</td>
<td>H04B 10/50</td>
</tr>
<tr>
<td>Receivers</td>
<td>H04B 10/60</td>
</tr>
<tr>
<td>Photonic quantum communication</td>
<td>H04B 10/70</td>
</tr>
</tbody>
</table>
H04B 10/808
{Electrical power feeding of an optical transmission system}

References

Informative references
Attention is drawn to the following places, which may be of interest for search:

| Power feeding arrangements in general | H04B 3/44 |

H04B 10/85
Protection from unauthorised access, e.g. eavesdrop protection

Definition statement
This place covers:
Subject-matter dealing with protection from unauthorised access, e.g. eavesdrop protection. Concerning eavesdrop protection it is noted that it is irrelevant whether the signal to be protected from eavesdropping is encrypted or not.

H04B 10/90
Non-optical transmission systems, e.g. transmission systems employing non-photonic corpuscular radiation

Definition statement
This place covers:
Non-optical transmission systems that fall under the scope of the title of the main group; e.g. transmission system using Teraherz waves below the far infrared range or particles.

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

Definition statement
This place covers:
Transmission systems employing ultrasonic, sonic or infrasonic waves.

References

Informative references
Attention is drawn to the following places, which may be of interest for search:

| Speech analysis or synthesis; Speech recognition | G10L |
| Telephonic communication | H04M |
| Loudspeakers, microphones or like acoustic electromechanical transducers | H04R |
| Stereophonic systems | H04S |
**H04B 13/00**

*Transmission systems characterised by the medium used for transmission, not provided for in groups H04B 3/00 - H04B 11/00*

**Definition statement**

*This place covers:*
Transmission systems where the medium for transmission is more pertinent than the type of signal.

**H04B 13/005**

{Transmission systems in which the medium consists of the human body}

**Definition statement**

*This place covers:*
Transmission systems where the medium is 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*

**Definition statement**

*This place covers:*
Transmission systems where the medium is the earth or a large mass of water.

**References**

*Informative references*

Attention is drawn to the following places, which may be of interest for search:

| 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 |
| Applications of earth currents | 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)*

**Definition statement**

*This place covers:*
Transmission systems characterised by the use of a carrier modulation;

Transmission systems characterised by the use of pulse modulation, differential modulation or subcarrier modulation.
## References

### Limiting references

This place does not cover:

<table>
<thead>
<tr>
<th>Description</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>details of transmission systems not characterized by the medium used</td>
<td>H04B 1/00</td>
</tr>
<tr>
<td>Data mapping in impulse radio systems</td>
<td>H04B 1/7176</td>
</tr>
<tr>
<td>Polarisation modulation and/or switching with transmission through light guides</td>
<td>H04B 10/532</td>
</tr>
<tr>
<td>Amplitude modulation</td>
<td>H03C 1/00</td>
</tr>
<tr>
<td>Angle modulation</td>
<td>H03C 3/00</td>
</tr>
<tr>
<td>Ofdm modulation techniques</td>
<td>H04L 27/2601</td>
</tr>
</tbody>
</table>

### Informative references

Attention is drawn to the following places, which may be of interest for search:

<table>
<thead>
<tr>
<th>Description</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impulse radio</td>
<td>H04B 1/7163</td>
</tr>
<tr>
<td>Demodulation or transference of modulation from one carrier to another</td>
<td>H03D</td>
</tr>
<tr>
<td>Coding, decoding or code conversion, in general</td>
<td>H03M</td>
</tr>
<tr>
<td>Frequency modulated carrier systems</td>
<td>H04L 27/10</td>
</tr>
<tr>
<td>Amplitude modulated carrier systems</td>
<td>H04L 27/34</td>
</tr>
</tbody>
</table>

### H04B 14/02

characterised by the use of pulse modulation (in radio transmission relays H04B 7/17)

### References

#### Limiting references

This place does not cover:

<table>
<thead>
<tr>
<th>Description</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>in radio transmission relays</td>
<td>H04B 7/17</td>
</tr>
</tbody>
</table>

#### Informative references

Attention is drawn to the following places, which may be of interest for search:

<table>
<thead>
<tr>
<th>Description</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transmission of digital information per se</td>
<td>H04L</td>
</tr>
</tbody>
</table>

### H04B 14/04

using pulse code modulation

### References

#### Informative references

Attention is drawn to the following places, which may be of interest for search:

<table>
<thead>
<tr>
<th>Description</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analogue/digital or digital/analogue conversion per se</td>
<td>H03M 1/00</td>
</tr>
</tbody>
</table>
H04B 14/06
using differential modulation, e.g. delta modulation

References

Informative references
Attention is drawn to the following places, which may be of interest for search:

Conversion of analogue values to or from differential modulation

H04N 7/24

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

Definition statement
This place covers:
Reduction or elimination of unwanted disturbances of the information transmission.

References

Limiting references
This place does not cover:

Suppression or limitation of noise or interference by means associated with receiver

H04B 1/10

Informative references
Attention is drawn to the following places, which may be of interest for search:

Structural association with measuring or protective devices or electric components with suppressor for radio interference

H02K 11/00

Screening of apparatus or components against electric or magnetic fields

H05K 9/00

H04B 15/02
Reducing interference from electric apparatus by means located at or near the interfering apparatus

References

Informative references
Attention is drawn to the following places, which may be of interest for search:

Structural association with measuring or protective devices or electric components with suppressor for radio interference

H02K 11/00

Screening of apparatus or components against electric or magnetic fields

H05K 9/00
H04B 15/025

{Reducing interference from ignition apparatus of fuel engines (cables with high resistance H01B)}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| Cables with high resistance | H01B |

H04B 15/04

the interference being caused by substantially sinusoidal oscillations, e.g. in a receiver or in a tape-recorder

Definition statement

This place covers:

interference from harmonics of clock frequency generators in transmission equipment

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

| In computer clock generators G06F 1/08 |
| reducing parasitic oscillations H03B, H03F |
| In PLL frequency synthesizers H03L 7/18 |
| Screening H05K 9/00 |

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)

Definition statement

This place covers:

- Methods and apparatus for determining the manner in which a transmission system is functioning
- Methods and apparatus for determining the existence, type and location of any trouble
- Monitoring of the communications radio link between the transmitter and the receiver
- Measurements of quality parameters of the transmission/reception signal
- Monitoring of the transmission/reception path
- Modelling the propagation channel
References

Limiting references

This place does not cover:

<table>
<thead>
<tr>
<th>Monitoring, testing line transmission systems</th>
<th>H04B 3/46</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arrangements for monitoring or testing transmission systems employing electromagnetic waves other than radio waves, e.g. infrared, visible or ultraviolet light</td>
<td>H04B 10/07</td>
</tr>
</tbody>
</table>

Informative references

Attention is drawn to the following places, which may be of interest for search:

<table>
<thead>
<tr>
<th>Details of Transmitters</th>
<th>H04B 1/02</th>
</tr>
</thead>
<tbody>
<tr>
<td>Details of Receivers</td>
<td>H04B 1/06</td>
</tr>
<tr>
<td>Monitoring arrangements in multiplex communication</td>
<td>H04J 1/16; H04J 3/14</td>
</tr>
<tr>
<td>Monitoring arrangements; Testing arrangements in data switching networks</td>
<td>H04L 41/06</td>
</tr>
<tr>
<td>Supervisory, testing and monitoring arrangements for wireless communication networks</td>
<td>H04W 24/00</td>
</tr>
</tbody>
</table>

H04B 17/17

Detection of non-compliance or faulty performance, e.g. response deviations (H04B 17/18 takes precedence)

Definition statement

This place covers:

Arrangements to detect conditions or status of non-compliance or faulty performance due to failure or degradation.

References

Limiting references

This place does not cover:

| Monitoring during normal operation                              | H04B 17/18   |

H04B 17/18

Monitoring during normal operation

Definition statement

This place covers:

Arrangements to monitor performance of the transmission system when in use.
**H04B 17/27**

for locating or positioning the transmitter

**References**

**Informative references**

Attention is drawn to the following places, which may be of interest for search:

| Locating or presence detecting by the use of reflection or reradiation of radio waves | G01S 13/00 |
| Satellite radio beacon positioning systems | G01S 19/00 |
| Locating users or terminals for network management purposes | H04W 64/00 |

**H04B 17/309**

Measuring or estimating channel quality parameters

**Definition statement**

This place covers:

Arrangements to calculate the present and/or past channel quality parameters based on the present and/or past measured values.

**References**

**Informative references**

Attention is drawn to the following places, which may be of interest for search:

| Predicting channel quality parameters | H04B 17/373 |

**H04B 17/373**

Predicting channel quality parameters

**Definition statement**

This place covers:

Arrangements to project the future channel quality parameters based on the present and/or past measured values.

**References**

**Informative references**

Attention is drawn to the following places, which may be of interest for search:

| Measuring or estimating channel quality parameters | H04B 17/309 |
H04B 17/382
for resource allocation, admission control or handover

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

<table>
<thead>
<tr>
<th>Central resource management</th>
<th>H04W 28/16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hand-off or reselecting arrangements</td>
<td>H04W 36/00</td>
</tr>
<tr>
<td>Access restriction; Network selection; Access point selection</td>
<td>H04W 48/00</td>
</tr>
<tr>
<td>Local resource management</td>
<td>H04W 72/00</td>
</tr>
</tbody>
</table>

H04B 17/391

Modelling the propagation channel

Definition statement

This place covers:

- Simulation to reproduce propagation environment on computers
- Emulation of actual propagation environment using testing apparatus