

## H04J

**MULTIPLEX COMMUNICATION** (transmission in general [H04B](#); peculiar to transmission of digital information [H04L 5/00](#); systems for the simultaneous or sequential transmission of more than one television signal [H04N 7/08](#); in exchanges [H04Q 11/00](#); stereophonic systems [H04S](#))

### Definition statement

*This place covers:*

Multiplex Communication having circuits or apparatus for combining or dividing signals for the purpose of transmitting the signals simultaneously or sequentially over the same transmission path, and monitoring arrangements therefor.

### Relationships with other classification places

Class [H04](#) Electric communication technique covers electrical communication systems with propagation paths employing beams of corpuscular radiation, acoustic waves or electromagnetic waves. Subclass [H04J](#) refers to multiplex communication in general. If the multiplex communication is specially adapted for particular applications classification is made in other subclasses of class [H04](#).

### References

#### Limiting references

*This place does not cover:*

Optical monitoring arrangements, independent of the multiplexing method	<a href="#">H04B 10/07</a> - <a href="#">H04B 10/0799</a>
Selecting arrangements for multiplex systems	<a href="#">H04Q 11/00</a>

#### 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:*

Use of multiplexing in transmission systems for measured values, control or similar signals	<a href="#">G08C 15/00</a>
Arrangements for transmission of digital information affording multiple use of the transmission path	<a href="#">H04L 5/00</a>
Systems for the simultaneous or sequential transmission of more than one television signal	<a href="#">H04N 7/08</a>

#### Informative references

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

Optical elements, systems or apparatus	<a href="#">G02B</a>
Addressing or transmission in computers	<a href="#">G06F 12/00</a> , <a href="#">G06F 13/00</a>
Electronic switching or gating	<a href="#">H03K 17/00</a>
Transmission in general	<a href="#">H04B</a>
Relay systems	<a href="#">H04B 7/14</a>
Broadcast communication	<a href="#">H04H</a>

Data switching networks	<a href="#">H04L 12/00</a>
Modulated-carrier systems	<a href="#">H04L 27/00</a>
Telephonic Communication	<a href="#">H04M</a>
Selecting techniques	<a href="#">H04Q</a>
Stereophonic systems	<a href="#">H04S</a>
Wireless communication networks	<a href="#">H04W</a>

## **H04J 1/00**

### **Frequency-division multiplex systems ([H04J 14/00](#) takes precedence)**

#### **Definition statement**

*This place covers:*

Frequency Division Multiplexing, FDM, by multiplexing two or more data sources. Covers particularly hierarchical multiplexing electrical frequencies in stages of power of 2, e.g. 8kHz, 64Khz.

#### **References**

##### **Limiting references**

*This place does not cover:*

FDM in satellite systems	<a href="#">H04B 7/15</a>
FDM in radio system	<a href="#">H04B 7/26</a>
OFDM	<a href="#">H04L 5/00</a>
OFDM synchronization	<a href="#">H04L 27/2601</a>

#### **Informative references**

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

Hybrid TDM/FDM	<a href="#">H04J 4/00</a>
SCM	<a href="#">H04J 14/0298</a>
FDM in CATV or HFC networks	<a href="#">H04N 7/00</a>

#### **Glossary of terms**

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

FDM	Frequency Division Multiplexing
OFDM	Orthogonal Frequency Division Multiplexing
SCM	Multiplexing of electrical subcarriers on an optical wavelength
CATV	CAble Television Systems
HFC	Hybrid Fiber Coax
TDM	Time Division Multiplex

## H04J 1/04

Frequency-transposition arrangements {(modulation with carrier or side-band suppression [H03C 1/52](#), [H03C 1/60](#); single-band suppression [H04B 1/00](#), [H04B 15/00](#); telegraphic communication [H04L 27/02](#), [H04L 25/49](#); transference of modulation from one carrier to another, e.g. frequency- changing [H03D 7/00](#); demodulation or transference of modulation of modulated electromagnetic waves [H03D 9/00](#))}

### Definition statement

*This place covers:*

Systems for transposing frequency channels carrying information onto frequency carriers Covers also FDM multiplexers, demultiplexers

### References

#### Informative references

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

TDM/FDM conversion of transmultiplexing	<a href="#">H04J 4/005</a>
-----------------------------------------	----------------------------

### Special rules of classification

[H04J 1/08](#) takes precedence

## H04J 1/05

using digital techniques

### Definition statement

*This place covers:*

Frequency translators, FDM multiplexers, demultiplexers, operating with digital techniques

### References

#### Limiting references

*This place does not cover:*

Group modulators /demodulators used for transmultiplexing FDM TDM	<a href="#">H04J 4/005</a>
-------------------------------------------------------------------	----------------------------

#### Informative references

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

Digital Filters	<a href="#">H03H 17/00</a>
-----------------	----------------------------

### Special rules of classification

[H04J 1/08](#) takes precedence

**H04J 1/06**

Arrangements for supplying the carrier waves {; Arrangements for supplying synchronisation signals (synchronisation in general [H03B](#); frequency multiplication [H03B 19/00](#), [H03B 21/00](#); mixing [H03D 7/00](#), [H03D 9/00](#); carrier supply [H04L 5/10](#))}

**References****Limiting references**

*This place does not cover:*

- Channel allocation	<a href="#">H04J 1/12</a>
----------------------	---------------------------

**H04J 1/08**

Arrangements for combining channels {(branching filters [H01P 1/213](#), [H03H 7/46](#))}

**References****Limiting references**

*This place does not cover:*

Branching filters	<a href="#">H01P 1/213</a> , <a href="#">H03H 7/46</a>
-------------------	--------------------------------------------------------

**Informative references**

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

Discrete frequency-selective devices, e.g. stubs, waveguides, directional filters	<a href="#">H01P 1/00</a>
-----------------------------------------------------------------------------------	---------------------------

**H04J 1/10**

Intermediate station arrangements, e.g. for branching, for tapping-off {(repeater circuits [H04B 3/36](#), [H04B 3/58](#); two-way amplifiers [H03F 3/62](#))}

**References****Informative references**

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

Two way amplifiers	<a href="#">H03F 3/62</a>
Repeater circuits	<a href="#">H04B 3/36</a>

## H04J 1/12

**Arrangements for reducing cross-talk between channels {(in line transmission systems [H04B 3/32](#); in cables or lines [H04B 3/26](#) - [H04B 3/30](#))}**

### Definition statement

*This place covers:*

Frequency allocation, including by demand or to reduce intermodulation;

### References

#### Informative references

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

In line transmission	<a href="#">H04B 3/32</a>
In baseband systems	<a href="#">H04L 25/085</a>

## H04J 3/00

**Time-division multiplex systems ([H04J 14/00](#) takes precedence; relay systems [H04B 7/14](#); selecting techniques [H04Q](#))**

### Definition statement

*This place covers:*

Hierarchical frame structures, the structure repeats continuously at a fixed rate. Typically these are standard TDM frame structures at 8kHz rate like PDH, SDH or OTN. Other fixed rates frames should also be classified here and related fields.

- fixed length Ethernet ([H04L 12/40](#))
- Digital audio transmission in fixed length formats ( [H04H](#), [H04R](#)).

Synchronization of TDM Frames

Packet transmission is classified for some specific applications:

Transmission of synchronous services like voice via packets, e.g. VoIP, is classified in [H04J 3/0632](#), when the source clock is recovered.

Alignment of packets using packet flags should be in [H04J 3/0602](#) for fixed line systems and in [H04L 7/04](#) in wireless, satellite or radio systems.

Ranging of packets in an uplink in systems with a TDM frame defined in the downlink, see [H04J 3/0682](#).

Note 1: Ranging or time alignment of a radio/wireless channel preferably in [H04W 56/00](#). For radio/ wireless systems data transmitted via a fixed network, e.g. connections between Mobile Switching Centre (MSC) and Base Station (BS) or between several Access Points (AP), documents referring to specific data of the radio/wireless channel are in [H04W 56/00](#), e.g. alignment for handover.

Allocation of packets within a TDM frame, e.g. Ethernet in OTN payload, see [H04J 3/16](#) or lower.

Allocation of packets in an uplink of a systems with a TDM frame defined above in the downlink, [H04J 3/1694](#).

Note 1 : This group refers to the allocation of the bandwidth.

Note 2 : Allocation in wireless systems, see [H04W](#) or [H04B 7/00](#);

Note 3 : Allocation of timeslots in PON, [H04Q 11/0001](#) takes precedence

Synchronization of TDMA or packets in the meaning of time alignment, the minimum entity of detection or correction is a bit. Smaller sub-bit values refer to bit synchronization of [H04L 7/00](#)

## References

### Limiting references

*This place does not cover:*

Recording	<a href="#">G11B</a>
Frame structures of wireless systems	<b>H04B4/26</b>
Relay systems	<a href="#">H04B 7/14</a>
Frame structures of OFDM	<a href="#">H04L 5/00</a>
Alignment of parallel data transmission	<a href="#">H04L 25/14</a>
Synchronization of digital video, e.g. STC or PCR timestamps	<a href="#">H04N 7/24</a>
Selecting techniques	<a href="#">H04Q</a>

### Informative references

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

Simulcast or Single Frequency Networks	<a href="#">H04H 20/00</a>
Cryptographic mechanisms or cryptographic; arrangements for secret or secure communications; Network security protocols	<a href="#">H04L 9/00</a>
Packet networks	<a href="#">H04L 12/00</a>
Network architectures or network communication protocols for network security	<a href="#">H04L 63/00</a>
Network arrangements, protocols or services for supporting real-time applications in data packet communication	<a href="#">H04L 65/00</a>
Network protocols for data switching network services Network arrangements or protocols for supporting network services or applications	<a href="#">H04L 67/00</a>
Digital audio for loudspeakers	<a href="#">H04R</a>

## Glossary of terms

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

SDH	Synchronous Digital Hierarchy
SONET	Synchronous Optical NETwork
OTN	Optical Transport Network
MulDex	Multiplexer/Demultiplexer

**H04J 3/02****Details (electronic switching or gating [H03K 17/00](#))****References****Limiting references***This place does not cover:*

Electronic switching or gating	<a href="#">H03K 17/00</a>
--------------------------------	----------------------------

**H04J 3/04**

**Distributors combined with modulators or demodulators {(pulse distributors in general [H03K 5/15](#); pulse counters [H03K 21/00](#) - [H03K 29/06](#); for telegraphy [H04L 5/22](#), [H04L 13/00](#) - [H04L 23/00](#), [H04L 25/45](#); for telephony [H04Q 11/04](#))}**

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

Pulse counters	<a href="#">H03K 5/15</a>
Pulse distributors in general	<a href="#">H03K 21/00</a>
SerDes not adapted for data communication of telecommunication	<a href="#">H03M 9/00</a>

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

SerDes	Serializer / Deserializer
--------	---------------------------

**H04J 3/045****{Distributors with CRT}****Glossary of terms***In this place, the following terms or expressions are used with the meaning indicated:*

CRT	Cathode Ray tubes
-----	-------------------

**H04J 3/047****{Distributors with transistors or integrated circuits}****Definition statement***This place covers:*

Details of multiplexing or demultiplexing of bits or bytes in arrangements specially adapted for time multiplexing.

Distributors with transistors or integrated circuits

## References

### Informative references

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

Timing and clocking in MulDex	<a href="#">H04J 3/0685</a>
Higher level of abstraction of hierarchical PDH MulDex	<a href="#">H04J 3/1641</a>
Details of discrete elements, e.g. transistors	<a href="#">H03K 17/00</a>

### Special rules of classification

Details of bit and byte multiplexers or demultiplexers per se, e.g. 2:1 pulse multiplexers and tree structures thereof, [H03M 9/00](#) takes precedence.

## H04J 3/06

**Synchronising arrangements {(for television systems [H04N 5/04](#); bit-synchronisation [H04L 7/00](#))}**

### Definition statement

*This place covers:*

Synchronization of TDM networks and some specific synchronization arrangements in TDMA or packet networks.

Synchronization of TDM networks covers:

Detection of FAW and alignment of frames, [H04J 3/0602](#);

Absorbing of phase or frequency differences by buffers, [H04J 3/062](#);

Distribution of synchronization information and organisation of the synchronization network, [H04J 3/0635](#).

Specific synchronization arrangement of packet or TDMA networks are:

Distribution of synchronization information and organisation of the synchronization network, [H04J 3/0635](#)

Source clock recovery over packet or ATM networks, e.g. VoIP, [H04J 3/0632](#).

### Relationships with other classification places

Synchronization of wireless network when mobility of radio channel is relevant, [H04W 56/00](#).

## References

### Limiting references

*This place does not cover:*

Smaller, sub-bit, values refer to bit synchronization	<a href="#">H04L 7/00</a>
-------------------------------------------------------	---------------------------

### Informative references

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

Synchronization in computer networks, e.g. Time of Day	<a href="#">G06F 1/04</a>
--------------------------------------------------------	---------------------------



Buffers between clock domains	<a href="#">G06F 5/06</a> ; <a href="#">H04L 7/005</a>
-------------------------------	--------------------------------------------------------

## Glossary of terms

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

FAW	Frame Alignment Word
-----	----------------------

## H04J 3/0602

**{Systems characterised by the synchronising information used}**

### Definition statement

*This place covers:*

A FAW is used as synchronising information for a TDM frame.

### References

#### Limiting references

*This place does not cover:*

Specific FAW	<a href="#">H04J 3/0605</a>
Details of the FAW detector	<a href="#">H04J 3/0608</a>
Detection of packet headers, e.g. HDLC flag	<a href="#">H04L 7/04</a>

### Informative references

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

Special synchronization information, e.g. for packet or mobile transmission	<a href="#">H04L 7/041</a>
-----------------------------------------------------------------------------	----------------------------

## Glossary of terms

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

FAW	Frame Alignment Word
-----	----------------------

## H04J 3/0605

**{Special codes used as synchronising signal}**

### Definition statement

*This place covers:*

Design rules of constructing FAW.

variable FAW, e.g. for low rate signalling, depending on the synchronization state.

## References

### Informative references

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

Signalling in TDM	<a href="#">H04J 3/12</a>
-------------------	---------------------------

## Special rules of classification

FAW of standardized frames, e.g. T1, SONET, SDH or OTN are known per se are not classified here. Their detection is classified in [H04J 3/0608](#).

## Glossary of terms

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

FAW	Frame Alignment Word
UW	Unique Word

## H04J 3/0608

{Detectors therefor, e.g. correlators, state machines}

### Definition statement

This place covers:

Detection of FAW by correlators, state machines, forward or backward protection.

## References

### Informative references

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

Digital correlators	<a href="#">G06F 17/15</a>
Detectors of UW for packet detection or symbol synchronisation	<a href="#">H04L 7/042</a>

## H04J 3/0611

{PN codes ([H04J 3/0608](#) takes precedence)}

### Definition statement

This place covers:

PN codes used for synchronisation, if the PN synchronisation signals is varying during transmission, e.g. by a feedback Shift-register. Fixed synchronisation signals, e.g. unique words or FAW signals, are not to be classified in this group. This also applies even if the synchronisation signal can be presented as a state of such a PN-code generator. Only if the generator shifts, then the document is classified here.

## References

### Informative references

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

PN codes used for synchronization in other transmission systems, e.g. packet or mobile	<a href="#">H04L 7/043</a>
----------------------------------------------------------------------------------------	----------------------------

## Special rules of classification

[H04J 3/0608](#) takes precedence for detection

## Synonyms and Keywords

In patent documents, the following abbreviations are often used:

PN code	Pseudo-Noise or Pseudorandom code
---------	-----------------------------------

## H04J 3/062

{Synchronisation of signals having the same nominal but fluctuating bit rates, e.g. using buffers (pulse-stuffing [H04J 3/07](#); asynchronous-synchronous conversion [H04L 5/24](#); speed conversion [H04L 25/05](#); speed conversion in computers [G06F 5/06](#))}

## Definition statement

This place covers:

Rate differences are compensated in a lossless way, e.g. by an elastic buffer or FIFO

## References

### Limiting references

This place does not cover:

Pulse stuffing	<a href="#">H04J 3/07</a>
Speed conversion in computers	<a href="#">G06F 5/06</a>
Speed conversion, e.g. 8 kHz to 9,2 kHz	<a href="#">H04L 25/05</a>

## Glossary of terms

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

FIFO	First In First Out buffer
------	---------------------------

**H04J 3/0623**

**{Synchronous multiplexing systems, e.g. synchronous digital hierarchy/synchronous optical network (SDH/SONET), synchronisation with a pointer process}**

**Definition statement**

*This place covers:*

Compensation of fluctuating rates in SDH/SONET or OTN

**References****Informative references**

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

PDH/SDH interfaces, e.g. desynchronizers	<a href="#">H04J 3/076</a>
------------------------------------------	----------------------------

**Synonyms and Keywords**

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

OTN	Optical Transport Network
-----	---------------------------

**H04J 3/0626**

**{plesiochronous multiplexing systems, e.g. plesiochronous digital hierarchy [PDH], jitter attenuators}**

**References****Informative references**

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

PDH/SDH interfaces, e.g. desynchronizers	<a href="#">H04J 3/076</a>
Slot or bandwidth allocation in PDH	<a href="#">H04J 3/1623</a>

**Synonyms and Keywords**

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

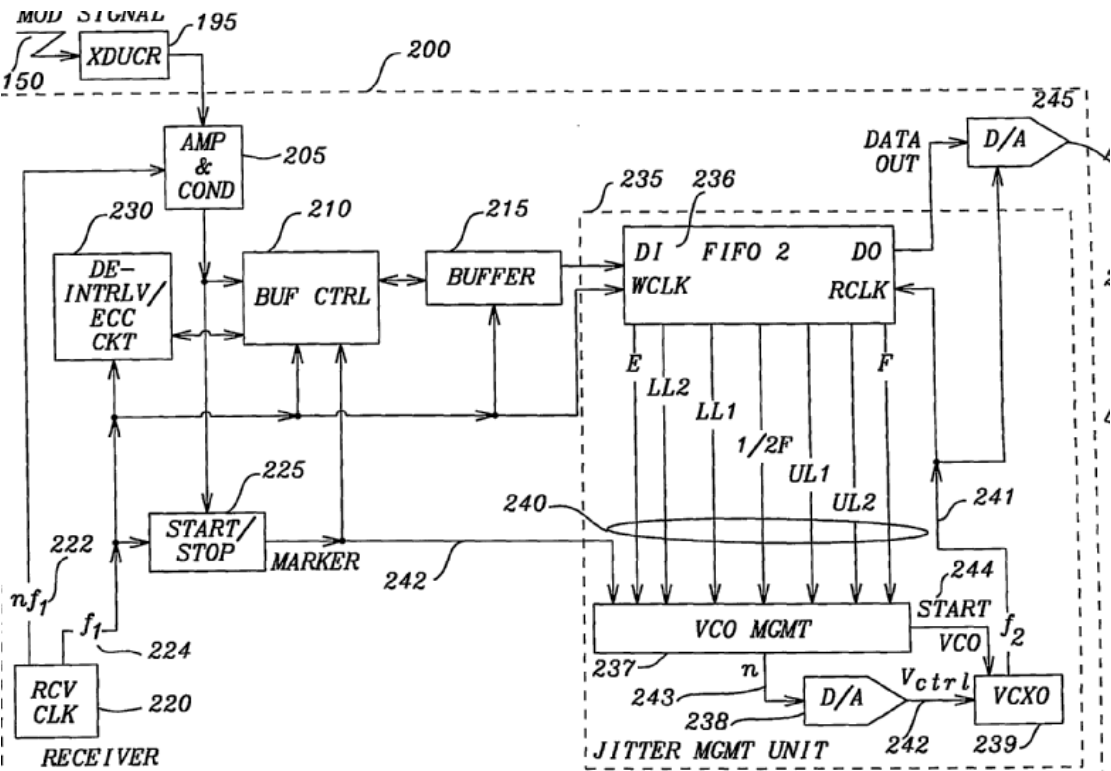
PDH	Plesiochronous Digital Hierarchy
-----	----------------------------------

H04J 3/0632

{Synchronisation of packets and cells, e.g. transmission of voice via a packet network, circuit emulation service [CES] (queuing arrangements in packet switching elements [H04L 49/90](#); synchronising systems for the synchronous transmission of a pulse code modulated video signal with one or more other pulse code modulated signals [H04N 7/56](#))}

Definition statement

This place covers:  
Recovery of source clock of Continuous Bit Rate (CBO) service, e.g. VoIP. The invention is located at the edge of the packet network and the output is a stream of bits, e.g. control of playout rate.



References

Limiting references

This place does not cover:

Queuing arrangements in packet switching elements	<a href="#">H04L 49/90</a>
Synchronising systems for the synchronous transmission of a pulse code modulated video signal with one or more other pulse code modulated signals	<a href="#">H04N 7/56</a>

Informative references

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

Flow control or congestion control	<a href="#">H04L 47/10</a>
------------------------------------	----------------------------

## Synonyms and Keywords

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

FIFO	First In First Out buffer or elastic buffer
RTS	Residual Time Stamps signalling a source clock offset compared to the network clock
SRTS	Synchronous Residual time stamps signalling a source clock offset compared to the network clock
SFET	Synchronous Frequency Encoding Technique signalling a source clock offset compared to the network clock
CES	Circuit Emulating Switching

## H04J 3/0638

**{Clock or time synchronisation among nodes; Internode synchronisation (synchronization for ring networks [H04L 12/422](#); data switching networks with synchronous transmission [H04L 12/43](#))}**

### Definition statement

*This place covers:*

Distribution of synchronisation information among nodes, e.g. leader-follower signalling or SSM.

TOD synchronization.

### References

#### Informative references

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

Clock synchronization path among nodes of more than two levels	<a href="#">H04J 3/0679</a>
In combination with delay compensation using timestamp to determine RTD	<a href="#">H04J 3/0682</a>
Clock synchronization in Computer Networks, e.g. TOD	<a href="#">G06F 1/14</a>
Synchronisation of Ring Networks	<a href="#">H04L 12/422</a>
Data switching networks with synchronous transmission	<a href="#">H04L 12/43</a>

## Synonyms and Keywords

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

SSM	Synchronization Status Message
RTD	Round Trip Delay
NTP	Network Time Protocol
PTP	Precision Time Protocol
TOD	Time Of Day

**H04J 3/0641****{Change of the master or reference, e.g. take-over or failure of the master}****Definition statement***This place covers:*

Signalling to prevent or recover from a failure in the synchronization network.

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

Fail safe arrangements within the node	<a href="#">H04J 3/0688</a>
Monitoring and fail safe arrangements in general	<a href="#">H04J 3/14</a>
Fail safe arrangements for synchronizers in general	<a href="#">H04L 7/0083</a>

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

APS	Automatic Protection Switching
-----	--------------------------------

**H04J 3/0652****{Synchronisation among time division multiple access [TDMA] nodes, e.g. time triggered protocol [TTP] (bus network with centralized control in which slots are of a TDMA packet structure [H04L 12/4035](#))}****References****Informative references***Attention is drawn to the following places, which may be of interest for search:*

Bus network with centralized control in which slots are of a TDMA packet structure	<a href="#">H04L 12/403</a>
------------------------------------------------------------------------------------	-----------------------------

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

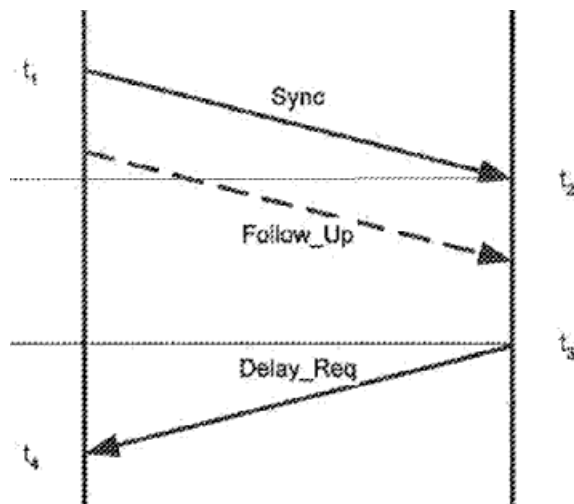
TTP	Time Triggered Protocol
-----	-------------------------

## H04J 3/0667

{Bidirectional timestamps, e.g. NTP or PTP for compensation of clock drift and for compensation of propagation delays (arrangements for monitoring round trip delays in packet switching networks [H04L 43/0864](#))}

### Definition statement

*This place covers:*



### References

#### Limiting references

*This place does not cover:*

Arrangements for monitoring round trip delays in packet switching networks	<a href="#">H04L 43/0864</a>
----------------------------------------------------------------------------	------------------------------

#### Informative references

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

Delay compensation for other types of time multiplexing, e.g. TDM/TDMA in a star configuration	<a href="#">H04J 3/0682</a>
Time supervision arrangements, e.g. real time clock	<a href="#">G06F 1/14</a>
Timer mechanisms used in protocols of packet data networks	<a href="#">H04L 69/28</a>

### Glossary of terms

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

NTP	Network Time Protocol
PTP	Precision Time Protocol

### Synonyms and Keywords

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

NTP	Network Time Protocol
-----	-----------------------



PTP	Precision Time Protocol
-----	-------------------------

*In patent documents, the following words/expressions are often used as synonyms:*

- "PTP" and "IEEE 1588"

## H04J 3/0673

**{using intermediate nodes, e.g. modification of a received timestamp before further transmission to the next packet node, e.g. including internal delay time or residence time into the packet}**

### Definition statement

*This place covers:*

Adding or modification of delay information, e.g. residence time in PTP

### References

#### Informative references

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

Interconnection of networks	<a href="#">H04L 12/46</a>
-----------------------------	----------------------------

### Synonyms and Keywords

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

PTP	Precision Time Protocol
-----	-------------------------

## H04J 3/0676

**{Mutual}**

### Definition statement

*This place covers:*

Exchange of synchronization information, e.g. buffer fill. Coupling clocks, e.g. by adding weighted signals of clock or phase errors.

### References

#### Informative references

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

Clock selection in a TDM node	<a href="#">H04J 3/0688</a>
-------------------------------	-----------------------------

**H04J 3/0679****{by determining clock distribution path in a network}****Definition statement***This place covers:*

Determination or initialisation of clock distribution path among more than two levels of nodes according to parameters, e.g. priority, path length, number of hops, clock quality, statistics. Avoidance of clock loops or timing islands.

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

SSM	Synchronisation Status Message
-----	--------------------------------

**H04J 3/0682****{by delay compensation, e.g. by compensation of propagation delay or variations thereof, by ranging}****Definition statement***This place covers:*

RTD measurement in TDM or TDMA networks for the purpose of timing adjustment, clock correction or time alignment.

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

Bidirectional timestamps, e.g. NTP or PTP for compensation of clock drift and for compensation of propagation delays	<a href="#">H04J 3/067</a>
Synchronization in mobile networks	<a href="#">H04W 56/0055</a>

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

RTD measurement and compensation in satellite systems	<a href="#">H04B 7/2125</a>
RTD measurement for network management or monitoring	<a href="#">H04L 43/0852</a>
PON in general	<a href="#">H04Q 11/0001</a>

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

PON	Passive Optical Network
CATV	CABle TeleVision
RTD	Round Trip Delay

**H04J 3/0688****{Change of the master or reference, e.g. take-over or failure of the master}****References****Informative references***Attention is drawn to the following places, which may be of interest for search:*

Monitoring and fail safe arrangements in general	<a href="#">H04J 3/14</a>
Fail safe arrangements of PLL	<a href="#">H03L 7/00</a>
Fail safe arrangements for synchronizers in general	<a href="#">H04L 7/0083</a>

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

APS	Automatic Protection Switching
-----	--------------------------------

**H04J 3/0694****{Synchronisation in a TDMA node, e.g. TTP}****Synonyms and Keywords***In patent documents, the following abbreviations are often used:*

TTP	Time Triggered Protocol
-----	-------------------------

**H04J 3/0697****{Synchronisation in a packet node}****Synonyms and Keywords***In patent documents, the following abbreviations are often used:*

PTP	Precision Time Protocol
-----	-------------------------

**H04J 3/07****using pulse stuffing for systems with different or fluctuating information rates  
{or bit rates}****Definition statement***This place covers:*

Variable length stuffing; self marking stuff indications

This subgroup does not refer to stuffing of packet flags as line coding to interrupt a long sequence of identical bit values.

## References

### Informative references

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

Fill bit or bits in non-TDM formats,	<a href="#">H04L 2007/045</a>
Cryptographic mechanisms or cryptographic; arrangements for secret or secure communications; Network security protocols	<a href="#">H04L 9/00</a>
Line coding	<a href="#">H04L 25/49</a>
Network architectures or network communication protocols for network security	<a href="#">H04L 63/00</a>
Network arrangements, protocols or services for supporting real-time applications in data packet communication	<a href="#">H04L 65/00</a>
Network protocols for data switching network services Network arrangements or protocols for supporting network services or applications	<a href="#">H04L 67/00</a>

## Synonyms and Keywords

In patent documents, the following abbreviations are often used:

WTJ	Waiting Time Jitter
STM	Stuff Threshold Modulation

In patent documents, the following words/expressions are often used as synonyms:

- "justification" and "stuffing"

## H04J 3/073

{Bit stuffing, e.g. PDH}

## References

### Informative references

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

PDH buffering	<a href="#">H04J 3/0626</a>
PDH framing formats and slot allocation	<a href="#">H04J 3/1623</a>

## H04J 3/076

{Bit and byte stuffing, e.g. SDH/PDH desynchronisers, bit-leaking}

## Definition statement

This place covers:

Stuffing in OTN

## References

### Informative references

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

Buffer arrangements for synchronization in SDH/SONET or OTN	<a href="#">H04J 3/0623</a>
-------------------------------------------------------------	-----------------------------

## Synonyms and Keywords

In patent documents, the following abbreviations are often used:

OTN	Optical Transport Network
-----	---------------------------

## H04J 3/08

Intermediate station arrangements, e.g. for branching, for tapping-off

### Definition statement

This place covers:

ADM Add Drop Multiplexers

### Synonyms and Keywords

In patent documents, the following abbreviations are often used:

ADM	Add Drop Multiplexer
-----	----------------------

## H04J 3/085

{for ring networks, e.g. SDH/SONET rings, self-healing rings, meashed SDH/SONET networks}

### Definition statement

This place covers:

Protection in TDM ring networks

## References

### Limiting references

This place does not cover:

Protection in TDM networks in general	<a href="#">H04J 3/14</a>
Protection in optical ring networks	<a href="#">H04J 14/0287</a>
Protection in packet ring networks, e.g. RPR	<a href="#">H04L 12/437</a>

## Synonyms and Keywords

In patent documents, the following abbreviations are often used:

CW	Clockwise
CCW	Counter Clockwise
UPSR	Unidirectional Protection Switched Ring

BLSR	Bidirectional Line Switched Ring
------	----------------------------------

## H04J 3/125

{One of the channel pulses or the synchronisation pulse is also used for transmitting monitoring or supervisory signals}

### Definition statement

*This place covers:*

Bit stealing for signalling, e.g. winking in PDH T1.

### References

#### Informative references

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

LSB bit dropping for making bandwidth available for user payload	<a href="#">H04J 3/1688</a>
------------------------------------------------------------------	-----------------------------

## H04J 3/14

Monitoring arrangements {(for SDH/SONET rings [H04J 3/085](#))}

### Definition statement

*This place covers:*

Protection Switching; Testing of TDM systems.

### References

#### Limiting references

*This place does not cover:*

Monitoring or Protection Switching of TDM rings	<a href="#">H04J 3/085</a>
Protection switching of SDH/SONET or OTN	<a href="#">H04J 2203/006</a>

#### Informative references

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

Network management	<a href="#">H04L 41/00</a>
--------------------	----------------------------

## H04J 3/16

in which the time allocation to individual channels within a transmission cycle is variable, e.g. to accommodate varying complexity of signals, to vary number of channels transmitted ([H04J 3/17](#), [H04J 3/24](#) take precedence)

### Definition statement

*This place covers:*

Covering variable time slot allocation.

[H04J 3/1605](#) fixed standard frame structures.

Definition statement

[H04J 3/1611](#) SDH

[H04J 3/1623](#) PDH

[H04J 3/1652](#) OTN;

[H04J 3/1682](#) statistical multiplexers, allocation changes per frame cycle

[H04J 3/1694](#) distributed multiplexers, e.g. access multiplexer

### Relationships with other classification places

For specific applications, e.g. video [H04N 7/00](#); or physical medium, e.g. radio [H04B 7/00](#), see more specialized classes

## H04J 3/1611

{Synchronous digital hierarchy [SDH] or SONET ([H04J 3/1664](#) takes precedence for interactions with OTN)}

### Definition statement

*This place covers:*

Refers to systems according to ITU recommendations G.707 - G.709 in the versions of 1990 (SDH/SONET)

Radio, satellite and microwave transmission according to the standards mentioned above.

Covers switches, nodes and Cross-connects and respective internal or proprietary formats

### References

#### Limiting references

*This place does not cover:*

Interactions with OTN	<a href="#">H04J 3/1664</a>
-----------------------	-----------------------------

#### Informative references

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

SDH/SONET or OTN ring networks	<a href="#">H04J 3/085</a>
--------------------------------	----------------------------

### Synonyms and Keywords

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

SPE	Synchronous Payload Envelope
-----	------------------------------

## H04J 3/1617

{carrying packets or ATM cells}

### Definition statement

*This place covers:*

SPE carries ATM cells or payload data packets

## Relationships with other classification places

[H04J 2203/0082](#) Services, Interaction of SDH with non-ATM protocols

[H04J 2203/0083](#) Support of the IP protocol

[H04J 2203/0085](#) Support of Ethernet

## References

### Informative references

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

Stuffing, destuffing and desynchronization	<a href="#">H04J 3/076</a>
SDH/SONET or OTN ring networks	<a href="#">H04J 3/085</a>
Cryptographic mechanisms or cryptographic; arrangements for secret or secure communications; Network security protocols	<a href="#">H04L 9/00</a>
Packet networks in general	<a href="#">H04L 12/00</a>
Network architectures or network communication protocols for network security	<a href="#">H04L 63/00</a>
Network arrangements, protocols or services for supporting real-time applications in data packet communication	<a href="#">H04L 65/00</a>
Network protocols for data switching network services Network arrangements or protocols for supporting network services or applications	<a href="#">H04L 67/00</a>

## Synonyms and Keywords

In patent documents, the following abbreviations are often used:

PoS	Packet over SONET
GFP	Generic Framing Procedure
SPE	Synchronous Payload Envelope

## H04J 3/1623

### {Plesiochronous digital hierarchy [PDH]}

#### Definition statement

*This place covers:*

Covers switches, nodes and Cross-connects and respective internal or proprietary formats.

Also covers transport of packets via a plesiochronous network, e.g. "ATM over E1".

## H04J 3/1629

### {Format building algorithm}

#### Definition statement

*This place covers:*

Time slot allocation according to rules, e.g. to evenly distributed slots to various users while minimizing the distance to ideal evenly distributed slot allocation for a single user.



## References

### Informative references

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

Splitting time slots to smaller entities or concatenating time slots to larger entities	<a href="#">H04J 3/1647</a>
Time slot allocation according the instantaneous needs of the sources to be multiplexed	<a href="#">H04J 3/1682</a>

## H04J 3/1635

{Format conversion, e.g. CEPT/US}

### Definition statement

*This place covers:*

Format conversion of PDH frames of different standards, e.g. ETSI and ANSI

## H04J 3/1641

{Hierarchical systems}

### Definition statement

*This place covers:*

DS0, DS1, DS3 or European PDH, PCM30/32, E1 to E4 according to ITU recommendation G.703. Covers the hardware structure of programmable TDM multiplexer, e.g. internal construction by bus, as described in ITU recommendation G.797.

## References

### Informative references

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

Electronic details of multiplexers or demultiplexers, e.g. multiplexing of bits or bytes	<a href="#">H04J 3/047</a>
------------------------------------------------------------------------------------------	----------------------------

## Synonyms and Keywords

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

MULDEX	Multiplexer Demultiplexer
--------	---------------------------

## H04J 3/1647

{Subrate or multislot multiplexing}

### Definition statement

*This place covers:*

Variable allocation of elementary units like time slots, subslots or fragments. The allocation can be modified by splitting elementary units or by combining elementary units to units of larger bandwidth. The overall frame length remains constant.

**H04J 3/1652****{Optical Transport Network [OTN]}****Definition statement**

*This place covers:*

Refers to systems according to ITU recommendation G.707 - G.709 in the versions of 2000.

Covers radio and microwave transmission according to the standards mentioned above.

Covers switches, nodes and Cross-connects and respective internal or proprietary formats.

**References****Informative references**

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

SDH/SONET or OTN ring networks	<a href="#">H04J 3/085</a>
SDH/SONET as preceding technology to OTN	<a href="#">H04J 3/1611</a>
Optical wavelength-division multiplex systems	<a href="#">H04J 14/02</a>
WDM optical network architectures	<a href="#">H04J 14/0278</a>

**Synonyms and Keywords**

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

SPE	Synchronous Payload Envelope
-----	------------------------------

**H04J 3/1658**

**{carrying packets or ATM cells; ([H04J 3/1664](#) takes precedence for payloads with different packet types)}**

**Special rules of classification**

[H04J 3/1664](#) takes precedence for payloads with different packet types

**H04J 3/167**

**{interaction with SDH/SONET, e.g. carrying SDH/SONET frames, interfacing with SDH/SONET ([H04J 3/1664](#) takes precedence)}**

**Special rules of classification**

[H04J 3/1664](#) takes precedence

## H04J 3/1676

**{Time-division multiplex with pulse-position, pulse-interval, or pulse-width modulation}**

### References

#### Informative references

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

Free space optical transmission with PPM or PWM	<a href="#">H04B 10/11</a>
General PPM or PWM transmission	<a href="#">H04B 14/026</a>
PPM or PWM modulation	<a href="#">H04L 25/4902</a>

## H04J 3/1682

**{Allocation of channels according to the instantaneous demands of the users, e.g. concentrated multiplexers, statistical multiplexers}**

### Definition statement

*This place covers:*

Allocation of bandwidth changes instantaneously, e.g. on demand or according to buffer fill.

### References

#### Informative references

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

Distributed multiplexers, e.g. access multiplexers	<a href="#">H04J 3/1694</a>
Packet multiplexing in general	<a href="#">H04J 3/247</a>
Hybrid switching, e.g. moveable boundary between CS and PS	<a href="#">H04L 12/64</a>
Voice over Data multiplexing for a single user	<a href="#">H04M 11/06</a>
Statistical multiplexing for video or multimedia	<a href="#">H04N 7/24</a>

### Glossary of terms

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

CS	Circuit Switched service
PS	Packet Switched service

## H04J 3/1688

{the demands of the users being taken into account after redundancy removal, e.g. by predictive coding, by variable sampling (reducing bandwidth of signals in general [H04B 1/66](#); in PCM-systems [H04B 14/046](#); removal of redundancy in telegraph communication [H03M 7/30](#))}

### References

#### Limiting references

*This place does not cover:*

Reducing bandwidth of signals in general	<a href="#">H04B 1/66</a>
Reducing bandwidth of signals in PCM-systems	<a href="#">H04B 14/046</a>

#### Informative references

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

LSB dropping of bit stealing for transporting signalling	<a href="#">H04J 3/125</a>
Digital Speech Interpolation (DSI)	<a href="#">H04J 3/177</a>
Digital Circuit Multiplication (DCM)	<a href="#">H04J 3/177</a>

## H04J 3/1694

{Allocation of channels in TDM/TDMA networks, e.g. distributed multiplexers (Passive Optical Networks [H04Q 11/0062](#))}

### References

#### Limiting references

*This place does not cover:*

Time slot allocation in Passive Optical Networks	<a href="#">H04Q 11/0062</a>
Time slot allocation in wireless networks	<a href="#">H04W 72/04</a> , <a href="#">H04B 7/2643</a>

#### Informative references

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

Time slot allocation in computer networks via CATV or HFC	<a href="#">H04L 12/2801</a>
-----------------------------------------------------------	------------------------------

### Synonyms and Keywords

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

CATV	CAble TeleVision
HFC	Hybrid Fibre Coax

## H04J 3/17

in which the transmission channel allotted to a first user may be taken away and re-allotted to a second user if the first user becomes inactive, e.g. TASI {(speech analysis or identification [G10L](#))}

### References

#### Limiting references

*This place does not cover:*

DTX in wireless networks for power saving	<a href="#">H04W 76/28</a> , <a href="#">H04W 52/12</a>
-------------------------------------------	------------------------------------------------------------

#### Informative references

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

Distributed multiplexers, e.g. access multiplexers	<a href="#">H04J 3/1694</a>
Speech analysis	<a href="#">G10L</a>
Silence suppression in packet networks	<a href="#">H04L 2012/6494</a>

### Glossary of terms

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

DTX	Discontinuous Transmission
Comfort Noise	Introduction of noise signal to have a more comfortable audio signal during speech pauses

### Synonyms and Keywords

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

TASI	Time Assignment Speech Interpolation
DSI	Digital Speech Interpolation

## H04J 3/172

{Digital speech interpolation, i.e. DSI}

### References

#### Limiting references

*This place does not cover:*

PRMA (Packet Reservation Multiple Access),	<a href="#">H04L 12/00</a> , <a href="#">H04W</a>
--------------------------------------------	---------------------------------------------------

## H04J 3/175

{Speech activity or inactivity detectors (echo suppressors [H04B 3/20](#))}

### References

#### Informative references

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

VAD	<a href="#">G10L 25/78</a>
Instant speaker's algorithm in telephony systems	<a href="#">H04M 3/569</a>

### Synonyms and Keywords

In patent documents, the following abbreviations are often used:

VAD	Voice Activity Detection
-----	--------------------------

## H04J 3/18

using frequency compression and subsequent expansion of the individual signals

### References

#### Informative references

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

Frame conversion	<a href="#">H04J 3/1635</a>
------------------	-----------------------------

## H04J 3/22

in which the sources have different rates or codes {(simultaneous speech and digital data or video transmission [H04M 11/06](#); see provisional also [H04J 3/16](#))}

### Definition statement

This place covers:

Different symbol rates in the slots of the TDM frame.

### Relationships with other classification places

Different or variable user rates or source rates are classified under [H04J 3/1605](#) or sub-groups.

## H04J 3/24

in which the allocation is indicated by an address {the different channels being transmitted sequentially} ([H04J 3/17](#) takes precedence; in computers [G06F 12/00](#), [G06F 13/00](#) {code multiplex systems [H04J 13/00](#); selecting techniques [H04Q](#); relay systems [H04B 7/14](#)})

### Special rules of classification

CDMA and Spread-spectrum communication, [H04J 13/00](#) takes precedence.

**H04J 3/242****{the frames being of variable length}****References*****Limiting references****This place does not cover:*

Variable length frames or packets to avoid errors	<a href="#">H04L 1/0078</a>
---------------------------------------------------	-----------------------------

**H04J 3/247****{ATM or packet multiplexing}****Definition statement***This place covers:*

Generic packet or ATM multiplexing

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

Packet multiplexing in general	<a href="#">H04L 12/00</a>
--------------------------------	----------------------------

**H04J 3/26****in which the information and the address are simultaneously transmitted****Definition statement***This place covers:*

Time frequency encoded transmission. The combination of time and frequency is determined by the receiver address and the transmitted information.

Transmission of address by Pulse Position Modulation (PPM).

Random sampling of analog sources

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

RADA	Random Access Discrete Address
------	--------------------------------

**H04J 4/00**

Combined time-division and frequency-division multiplex systems ([H04J 13/00](#) takes precedence {; data transmission [H04L 5/26](#); telemetry [G08C 15/00](#)})

**References****Limiting references**

*This place does not cover:*

Time and Frequency allocation of OFDM systems	<a href="#">H04L 5/00</a>
-----------------------------------------------	---------------------------

**Informative references**

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

Allocation of time/frequency in radio systems	<a href="#">H04B 7/2615</a>
-----------------------------------------------	-----------------------------

**Synonyms and Keywords**

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

OFDM	Orthogonal Frequency Division Multiplexing
------	--------------------------------------------

**H04J 4/005****{Transmultiplexing}****Definition statement**

*This place covers:*

Translation of TDM into FDM and vice versa.

**References****Informative references**

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

Group demodulation	<a href="#">H04J 1/05</a>
Satellite systems	<a href="#">H04B 7/15</a>

**H04J 7/00**

**Multiplex systems in which the amplitudes or durations of the signals in individual channels are characteristic of those channels**

**Definition statement**

*This place covers:*

Simultaneous transmission of analog and digital, e.g. by overmodulation



## References

### Informative references

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

FAW having a special amplitude	<a href="#">H04J 3/0614</a>
Multiple use of the transmission path the signals being represented by different amplitude or polarities, e.g. quadriplex	<a href="#">H04L 5/04</a>
Synchronization signal having a special amplitude	<a href="#">H04L 7/06</a>

## Glossary of terms

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

FAW	Frame Alignment Word of a TDM frame
-----	-------------------------------------

## H04J 9/00

**Multiplex systems in which each channel is represented by a different type of modulation of the carrier**

## References

### Limiting references

This place does not cover:

Modification of modulation constellation	<a href="#">H04L 27/3483</a>
------------------------------------------	------------------------------

## H04J 11/00

**Orthogonal multiplex systems, {e.g. using WALSH codes} ([H04J 13/00](#) takes precedence)**

## Definition statement

This place covers:

Orthogonal multiplex systems at the physical layer, techniques relating to problems arising from the multiplexing of users / base stations. Aspects that are covered include

cell search, i.e. how a mobile phone finds the identity of base stations;

interference handling and cancellation, at the transmitter, the receiver or both, especially

subtractive interference cancellation

intercell interference cancellation at the physical layer.

Examples of orthogonal multiplexing techniques are OFDMA [Orthogonal Frequency Division Multiple Access ], SC-FDMA [ Single Carrier Frequency Division Multiple Access ].

Examples of systems using orthogonal multiplexing are LTE [ Long Term Evolution ], LTE-advanced.

## Relationships with other classification places

Code multiplexing techniques, orthogonal or not, are classified in [H04J 13/00](#) if the focus is on the code multiplexing aspects and in [H04B 1/69](#) if the focus is on the implementation of the spread-

spectrum technique (e.g. details of how the signals are physically transmitted, received and processed).

## References

### Limiting references

*This place does not cover:*

Narrowband interference reduction	<a href="#">H04B 1/1036</a>
Direct sequence spread spectrum	<a href="#">H04B 1/7097</a>
Frequency Hopping	<a href="#">H04B 1/713</a>
Spatial processing techniques	<a href="#">H04B 7/02</a>
Allocation of channels of OFDM systems	<a href="#">H04L 5/00</a>
Details of Linear Filters and Decision Feedback Equalisers	<a href="#">H04L 25/03006</a>
Sequence estimation techniques, including multi user sequence estimation	<a href="#">H04L 25/03178</a>
Correlative coding in synchronous or start-stop systems	<a href="#">H04L 25/497</a>
OFDM modulation techniques	<a href="#">H04L 27/2601</a>
OFDM frequency synchronisation techniques	<a href="#">H04L 27/2655</a>
Power management	<a href="#">H04W 52/00</a>
Local resource allocation of wireless systems	<a href="#">H04W 72/00</a>

### Informative references

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

Cell search in CDMA systems	<a href="#">H04B 1/7083</a>
Interference aspects in CDMA systems	<a href="#">H04B 1/7097</a>
Broadcast communication	<a href="#">H04H</a>
Modulated-carrier systems	<a href="#">H04L 27/00</a>
Telephonic Communication	<a href="#">H04M</a>
Discovery of network devices for network data management	<a href="#">H04W 8/005</a>
Processing access restriction or access information	<a href="#">H04W 48/16</a>

## Special rules of classification

Additional information is classified with the corresponding CPC codes. Classification of additional information is compulsory.

## H04J 13/00

### Code division multiplex systems (for frequency hopping [H04B 1/713](#))

#### Definition statement

*This place covers:*

Code division multiplexing techniques which are related to the division of the communication medium according to codes.

## Definition statement

Aspects that are covered include types of codes, generation of codes and allocation of codes to channels.

### Relationships with other classification places

With regard to spread-spectrum techniques, the borderline between [H04J 13/00](#) and [H04B 1/69](#) 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).

Documents classified in [H04J 13/00](#) containing aspects of spectral spreading of interest for search, may also be classified in group [H04B 1/69](#).

With regard to systems that use frequency hopping as a means to divide the communication medium, it has been agreed that that frequency hopping is excluded from [H04J 13/00](#) even if it is used within the context of multiple access. Because the concepts dealt with in [H04J 13/00](#) do not have relevance for FH-CDMA even though frequency hopping can be used for CDMA (i.e. FH-CDMA), this subject-matter is exclusively classified in [H04B 1/713](#).

### References

#### Limiting references

*This place does not cover:*

MC-CDMA	<a href="#">H04J 11/00</a>
Details of the signal processing which are covered by systems that use frequency hopping as a means to divide the communication medium	<a href="#">H04B 1/713</a>

#### Informative references

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

Implementation of the spread-spectrum technique	<a href="#">H04B 1/69</a>
-------------------------------------------------	---------------------------

### Special rules of classification

Additional information is classified with the corresponding CPC codes. Classification of additional information is compulsory.

When classifying in this group, any aspect of spread spectrum techniques not specific to frequency hopping, and which is considered to represent information of interest for search, may also be classified in group [H04B 1/69](#).

### Synonyms and Keywords

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

CDMA	Code Division Multiple Access
MC-CDMA	Multi-carrier Code Division Multiple Access
OVSF	Orthogonal variable spreading factor

## H04J 14/00

### Optical multiplex systems

#### References

##### Informative references

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

Frequency-division multiplex systems	<a href="#">H04J 1/00</a>
Electrical Time-division multiplex systems	<a href="#">H04J 3/00</a>
Combined time-division and frequency-division multiplex systems	<a href="#">H04J 4/00</a>
Multiplex systems in which the amplitudes or durations of the signals in individual channels are characteristic of those channels	<a href="#">H04J 7/00</a>
Multiplex systems in which each channel is represented by a different type of modulation of the carrier	<a href="#">H04J 9/00</a>
Orthogonal multiplex systems	<a href="#">H04J 11/00</a>
Code division multiplex systems	<a href="#">H04J 13/00</a>
Optical coupling devices, e.g. optical fibres, optical gratings	<a href="#">G02B 6/00</a>
Optical integrated multiplexers and demultiplexers devices, e.g. AWG, optical interferometers	<a href="#">G02B 6/12007</a>
Optical coupling with wavelength selective means	<a href="#">G02B 6/293</a>
Devices or arrangements for the control of the intensity, colour, phase, polarisation or direction of light arriving from an independent light source, e.g. switching, gating, or modulating; Non-linear optics	<a href="#">G02F 1/00</a>
Demodulating light; Transferring the modulation of modulated light; Frequency-changing of light	<a href="#">G02F 2/00</a>
Laser, amplifier per se	<a href="#">H01S 3/00</a> , <a href="#">H01S 5/00</a>
Optical Transmission	<a href="#">H04B 10/00</a>
Optical switching per se	<a href="#">H04Q 11/0001</a>

#### Glossary of terms

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

ADM	Add-drop multiplex
CDC	Colourless, directionless or contentionless
DCN	Data center network
OAM	Orbital angular momentum
OAMP	Operation, administration, maintenance or provisioning
OLT	Optical line termination
ONU	Optical network unit
ROADM	Reconfigurable optical add/drop multiplexers
SCM	Sub-carrier multiplexing
TDM	Time division multiplexing
TOADM	Tunable optical add/drop multiplexers

WDM	Wavelength division multiplexing
WDM-PON	WDM Passive Optical Network
WSS	Wavelength selective switches

## H04J 14/002

### {Coherencemultiplexing}

#### Definition statement

*This place covers:*

Coherence Multiplex for data transmission

#### References

##### Informative references

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

Sensor systems	<a href="#">G08C 15/00</a>
Coherent homodyne or heterodyne systems	<a href="#">H04B 10/00</a>

## H04J 14/005

### {Optical Code Multiplex}

#### Definition statement

*This place covers:*

Optical code division multiplexing systems

#### References

##### Informative references

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

Electrical code division multiplexing	<a href="#">H04J 13/00</a>
---------------------------------------	----------------------------

## H04J 14/007

### {Orthogonal Optical Code Multiplex}

#### Definition statement

*This place covers:*

Orthogonal optical code division multiplexing systems

#### References

##### Informative references

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

Electrical orthogonal multiplexing systems	<a href="#">H04J 11/00</a>
--------------------------------------------	----------------------------

**H04J 14/02****Wavelength-division multiplex systems****Definition statement***This place covers:*

Wavelength division multiplex systems, in general, as well as WDM equipment terminal, e.g. WDM sources and WDM receivers.

**H04J 14/0201****{Add-and-drop multiplexing}****Definition statement***This place covers:*

Optical add and drop multiplexing systems for WDM systems

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

OADM	Optical Add and Drop multiplexing
------	-----------------------------------

**H04J 14/0202****{Arrangements therefor}****Definition statement***This place covers:*

Internal arrangements details of OADM for WDM systems

**H04J 14/0204****{Broadcast and select arrangements, e.g. with an optical splitter at the input before adding or dropping}****Definition statement***This place covers:*

OADM arrangements that first broadcast the input signals, typically implemented with an optical splitter at the input of the OADM, and then select among the signals before they are output.

**H04J 14/0205****{Select and combine arrangements, e.g. with an optical combiner at the output after adding or dropping}****Definition statement***This place covers:*

OADM arrangements that first selects among the input signals at the input of the OADM and then combines the signals before they are output, typically implemented with an optical combiner at the output of the OADM

**H04J 14/0206****{Express channels arrangements}****Definition statement**

*This place covers:*

OADM arrangements that allow express channels to be directly brought from the input of the OADM to the input of the OADM, typically for minimising the insertion losses incurred by those channels.

**H04J 14/0208****{Interleaved arrangements}****Definition statement**

*This place covers:*

OADM arrangements that include multiplexing and/or demultiplexing using interleavers, e.g. processing the odd and even WDM channels separately.

**H04J 14/0209****{Multi-stage arrangements, e.g. by cascading multiplexers or demultiplexers}****Definition statement**

*This place covers:*

OADM arrangements where multiplexing and/or demultiplexing are implemented by a cascading of multiple stages.

**H04J 14/021****{Reconfigurable arrangements, e.g. reconfigurable optical add/drop multiplexers [ROADM] or tunable optical add/drop multiplexers [TOADM]}****Definition statement**

*This place covers:*

Reconfigurable or tuneable OADM arrangements where the optical channels that are actually added or dropped can be changed during the operation of the OADM.

**H04J 14/0212****{using optical switches or wavelength selective switches [WSS]}****Definition statement**

*This place covers:*

OADM arrangements where the reconfiguration is accomplished by using optical switches or wavelength selective switches.

**H04J 14/02122****{Colourless, directionless or contentionless [CDC] arrangements}****Definition statement***This place covers:*

Colourless and/or directionless and/or contentionless reconfigurable ADM arrangements where there is no dependency to wavelength and/or for any added and dropped channels, any direction can be selected and/or for any added and dropped channels the same wavelength can be selected.

**H04J 14/02126****{Multicast switch arrangements}****Definition statement***This place covers:*

Reconfigurable ADM arrangements where channels are multicast/broadcast to a plurality of directions, e.g. multicast OADM (MC-OADM).

**H04J 14/0213****{Groups of channels or wave bands arrangements}****Definition statement***This place covers:*

OADM arrangements where the groups of channel or wave bands are processed together.

**H04J 14/0215****{Architecture aspects}****Definition statement***This place covers:*

Architecture aspects of OADM in WDM systems in terms of how they relate to the WDM networks where they are in.

**H04J 14/0216****{Bidirectional architectures}****Definition statement***This place covers:*

OADM architectures that are prepared to be used in bidirectional networks, meaning that the ports of the OADM are input and output ports at the same time and consequently the fibres connected at those ports transmit optical WDM signals in both directions.



**H04J 14/0217****{Multi-degree architectures, e.g. having a connection degree greater than two}****Definition statement***This place covers:*

OADM architectures that have more than one input and/or more than one output (the degree of a node in a network is defined as the number of input plus output ports of such node).

**H04J 14/0219****{Modular or upgradable architectures}****Definition statement***This place covers:*

OADM architectures constituted by modules that are repeated to increase the capabilities of the node, typically to upgrade the number of channels that can be added or dropped.

**H04J 14/022****{For interconnection of WDM optical networks}****Definition statement***This place covers:*

OADM architectures that are used for interconnecting different WDM networks, e.g. interconnected rings.

**H04J 14/0221****{Power control, e.g. to keep the total optical power constant}****Definition statement***This place covers:*

Power control in a WDM system. Subject covers equalizing power of the different wavelengths, e.g. to keep the total optical power constant or to control the optical power per channel in a WDM system so as to maintain constant a particular performance related characteristic. Also covers control of power transients due to add and drop wavelengths, wavelength switching, e.g. caused by protection switching, or wavelength re-allocation.

**H04J 14/02212****{by addition of a dummy signal}****Definition statement***This place covers:*

Arrangements for controlling/equalizing the optical power per channel or for groups of channels in a WDM system by adding a signal not carrying data, e.g. dummy wavelength(s), noise or pilot signal.

**H04J 14/02214****{by re-allocation of data channels}****Definition statement***This place covers:*

Arrangements for controlling/equalizing the optical power per channel or for groups of channels in a WDM system by adding/dropping/reallocating data channels, e.g. by adding/dropping/shuffling channel(s).

**H04J 14/02216****{by gain equalization}****Definition statement***This place covers:*

Arrangements for controlling/equalizing the optical power per channel or for groups of channels in a WDM system by controlling attenuation/gain of the data channel(s).

**H04J 14/02218****{Centralized control}****Definition statement***This place covers:*

Controlling/equalizing the optical power per channel or for group of channels in a WDM system where management of power control is central, e.g. configured by the Network Management System (NMS).

**H04J 14/02219****{Distributed control}****Definition statement***This place covers:*

Controlling/equalizing the optical power per channel or for group of channels in a WDM system where each node of the system acts independently to control/equalize power.

**H04J 14/0223****{Conversion to or from optical TDM}****Definition statement***This place covers:*

Conversion from WDM signals into OTDM or vice versa to facilitate the multiplexing or demultiplexing of optical channels.

**H04J 14/0224**

**{Irregular wavelength spacing, e.g. to accommodate interference to all wavelengths}**

**Definition statement**

*This place covers:*

WDM irregular allocation plans, typically to overcome non-linear effects or to accommodate optical channels of different bit rate. This group covers also regular schemes in which carriers remain unused, e.g. to avoid interference.

**H04J 14/0226**

**{Fixed carrier allocation, e.g. according to service}**

**Definition statement**

*This place covers:*

Fixed carrier allocation according to service or for a particular use, e.g. dummy channels to keep the power constant.

**H04J 14/0227**

**{Operation, administration, maintenance or provisioning [OAMP] of WDM networks, e.g. media access, routing or wavelength allocation}**

**Definition statement**

*This place covers:*

Wavelength allocation and assignment for WDM and the application of management to WDM networks. It covers routing, e.g. use of tables for wavelength routing, and wavelength allocation algorithms, dynamic allocation of wavelengths and use of a dedicated wavelength for OAM, e.g. optical service channel, and pilot tones for OAM. It also covers optical channel and optical multiplex identification and labelling, optical signalling in WDM networks and WDM networks restoration (in network restoration, as opposed to network protection, all available resources in the network are considered when looking for a new path to be established).

**References****Informative references**

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

Monitoring of optical transmission parameters in general	<a href="#">H04B 10/07</a>
----------------------------------------------------------	----------------------------

**H04J 2014/0253**

**{Allocation of downstream wavelengths for upstream transmission}**

**References****Informative references**

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

Optical transmission using a single light source for multiple stations	<a href="#">H04B 10/2587</a>
------------------------------------------------------------------------	------------------------------

**H04J 14/0267****{Optical signaling or routing}****References*****Informative references****Attention is drawn to the following places, which may be of interest for search:*

Routing or path finding of packets in data switching networks	<a href="#">H04L 45/00</a>
---------------------------------------------------------------	----------------------------

**H04J 14/0268****{Restoration of optical paths, e.g. p-cycles}****References*****Informative references****Attention is drawn to the following places, which may be of interest for search:*

Route fault recovery of packets in data switching networks	<a href="#">H04L 45/28</a>
------------------------------------------------------------	----------------------------

**H04J 14/0269****{using tables for routing}****References*****Informative references****Attention is drawn to the following places, which may be of interest for search:*

Organization of routing tables of packets in data switching networks	<a href="#">H04L 45/54</a>
----------------------------------------------------------------------	----------------------------

**H04J 14/0272****{Transmission of OAMP information}****References*****Informative references****Attention is drawn to the following places, which may be of interest for search:*

Arrangements for monitoring or testing transmission systems using a supervisory or additional signal for monitoring of optical transmission parameters	<a href="#">H04B 10/077</a>
--------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------

**H04J 14/02762****{Spectrum slot allocation}****Definition statement**

*This place covers:*

Spectrum allocation/assignment/optimisation for WDM systems, e.g. allocating flex-grid slots for channels, assigning super-channels or optimising spectral resources via de-fragmentation.

**H04J 14/02764****{Multiplex arrangements for radio-frequency networks access; policies therefor (radio over fibre arrangement [H04B 10/2575](#))}****Definition statement**

*This place covers:*

WDM arrangements for medium access of radio-frequencies networks; wavelength allocation rules for such arrangement, e.g. any haul transport network for LTE/5G networks, for example via PON.

**References****Limiting references**

*This place does not cover:*

Radio-over-fibre arrangements	<a href="#">H04B 10/2575</a>
-------------------------------	------------------------------

**H04J 14/0278****{WDM optical network architectures}****Definition statement**

*This place covers:*

WDM optical networks defined by the type of interconnection between WDM nodes

**H04J 14/0279****{WDM point-to-point architectures}****Definition statement**

*This place covers:*

WDM systems using a point to point network connection between two WDM nodes.

**H04J 14/028****{WDM bus architectures}****Definition statement**

*This place covers:*

Multiple WDM nodes connected to two adjacent WDM nodes, except for the two nodes constituting the bus head-end, and using a common optical fibre supporting a WDM signal.

**H04J 14/0282****{WDM tree architectures}****Definition statement**

*This place covers:*

A common WDM node is connected via multiple fibres to a multiplicity of other WDM nodes. It also covers the case of star networks, where multiple WDM nodes are interconnected to other WDM nodes using multiple optical fibres each supporting a WDM signal, typically using a star coupler.

**H04J 14/0283****{WDM ring architectures}****Definition statement**

*This place covers:*

WDM architecture where all WDM nodes are connected to two adjacent nodes using a common optical fibre supporting a WDM signal.

**H04J 14/0284****{WDM mesh architectures}****Definition statement**

*This place covers:*

WDM architecture where each WDM node is typically connected to every other node using multiple optical fibres, each supporting a WDM signal.

**H04J 14/0286****{WDM hierarchical architectures}****Definition statement**

*This place covers:*

WDM networks where different layers of interconnection between the different WDM nodes. Each layer can be of the same type of network architecture or of different types.

**H04J 14/02862****{WDM data centre network [DCN] architectures}****Definition statement**

*This place covers:*

WDM architecture of Data Centre Networks (DCN).

**H04J 14/0287****{Protection in WDM systems}****Definition statement**

*This place covers:*

Protection aspects in WDM systems, typically switching from a protected resource to a protection resource when a failure occurs. As opposed to network restoration, network protection considers only resources that have a priori been labelled as protection resources.

**H04J 14/0289****{Optical multiplex section protection}****Definition statement**

*This place covers:*

Protection is carried out at the level of the whole WDM multiplex.

**H04J 14/029****{Dedicated protection at the optical multiplex section (1+1)}****Definition statement**

*This place covers:*

A WDM multiplex is duplicated and transmitted simultaneously using two WDM multiplex signals. The selection of which WDM signal to receive is done at the WDM level and at the receiver end, typically without considering any specific signalling from the transmitter end.

**H04J 14/0291****{Shared protection at the optical multiplex section (1:1, n:m)}****Definition statement**

*This place covers:*

A WDM multiplex is transmitted using working resources and in case that a failure occurs, then the WDM multiplex is switched to the protection resource, typically shared by different nodes. At the receiver end the WDM signal coming via the protection resource is selected, typically this mechanism involves switching or bridging at both transmitter and receiver ends at the WDM multiplex level any requires some signalling between transmitter and receiver ends. The protection WDM multiplex can be used by low priority traffic until protection takes place.

**H04J 14/0294****{Dedicated protection at the optical channel (1+1)}****Definition statement**

*This place covers:*

A WDM channel is duplicated and transmitted simultaneously using two WDM channels. The selection of which WDM channel to receive is done at the channel level and at the receiver end, typically without considering any specific messaging from the transmitter end.

**H04J 14/0295****{Shared protection at the optical channel (1:1, n:m)}****Definition statement***This place covers:*

WDM channels are transmitted using working resources and in case that a failure occurs, then the WDM channel is switched to the protection resource, typically shared by different WDM channels. At the receiver end the WDM signal coming via the protection resource is selected, typically this mechanism involves switching or bridging at both transmitter and receiver ends at the channel level any requires some signalling between transmitter and receiver ends. The protection channels can be used by low priority traffic until protection takes place.

**H04J 14/0297****{Optical equipment protection}****Definition statement***This place covers:*

WDM is duplicated to protect the equipment against internal faults.

**H04J 14/0298****{with sub-carrier multiplexing [SCM]}****Definition statement***This place covers:*

Sub-carrier multiplexing system, e.g. for CATV.

**H04J 14/03****{WDM arrangements (ADM arrangements [H04J 14/0202](#); WDM network architectures [H04J 14/0278](#))}****Definition statement***This place covers:*

WDM arrangements, e.g. equipment, included in terminals or line to enable WDM transmission.

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

ADM arrangements	<a href="#">H04J 14/0202</a>
WDM network architectures	<a href="#">H04J 14/0278</a>



**H04J 14/0305****{in end terminals}****Definition statement***This place covers:*

WDM arrangements, e.g. equipment for end terminals, e.g. WDM transmitters/receivers or wavelength converters.

**H04J 14/0307****{Multiplexers; Demultiplexers}****Definition statement***This place covers:*

Multiplexers or demultiplexers, e.g. odd/even multiplexing or multistage.

**References****Informative references**

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

Optical coupling, mixing or splitting	<a href="#">G02B</a>
---------------------------------------	----------------------

**H04J 14/04****Mode multiplex systems****Definition statement***This place covers:*

Systems where the different modes of transmission in the optical fibres are used to multiplex different channels of information.

**H04J 14/05****{Spatial multiplexing systems}****Definition statement***This place covers:*

Systems where either optical wireless (i.e. free space), multiplexing (e.g. MIMO) or space division multiplexing (e.g. multicore) is used for multiplexing different channels of information.

**H04J 14/052****{using multicore fibre (mode multiplex systems [H04J 14/04](#))}****Definition statement***This place covers:*

Systems where the different cores of a multicore fibre are used to multiplex different channels of information.

## References

### Limiting references

*This place does not cover:*

Mode multiplex systems	<a href="#">H04J 14/04</a>
------------------------	----------------------------

## H04J 14/06

### Polarisation multiplex systems

#### Definition statement

*This place covers:*

System where the different states of polarisation of the light are used to multiplex different channels of information.

## References

### Informative references

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

Optical transmitters using polarisation modulation	<a href="#">H04B 10/532</a>
Optical receivers processing orthogonal polarisation components	<a href="#">H04B 10/6166</a>

## H04J 14/07

### {Orbital angular momentum [OAM] multiplex systems}

#### Definition statement

*This place covers:*

Systems where different orbital angular momenta of the light phase are used to multiplex different channels of information.

## H04J 14/08

### Time-division multiplex systems

#### Definition statement

*This place covers:*

Systems using optical time division multiplexing (OTDM). Time multiplexing of optical pulses.

## References

### Informative references

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

Optical synchronisation	<a href="#">H04L 7/0075</a>
-------------------------	-----------------------------

**H04J 14/083**

**{Add and drop multiplexing}**

**Definition statement**

*This place covers:*  
Optical add and drop multiplexing systems for OTDM systems.

**H04J 14/086**

**{Medium access ([H04J 3/16](#) takes precedence)}**

**Definition statement**

*This place covers:*  
Medium access in OTDM systems.

**References**

**Limiting references**

*This place does not cover:*

Time-division multiplex systems with variable time allocation to individual channels within a transmission cycle	<a href="#">H04J 3/16</a>
------------------------------------------------------------------------------------------------------------------	---------------------------