

# CPC COOPERATIVE PATENT CLASSIFICATION

## H ELECTRICITY

(NOTE omitted)

## H04 ELECTRIC COMMUNICATION TECHNIQUE

(NOTE omitted)

## H04W WIRELESS COMMUNICATION NETWORKS (broadcast communication [H04H](#); communication systems using wireless links for non-selective communication, e.g. wireless extensions [H04M 1/72](#))

### NOTES

1. This subclass covers :
  - communication networks for selectively establishing one or a plurality of wireless communication links between a desired number of users or between users and network equipment, for the purpose of transferring information via these wireless communication links;
  - networks deploying an infrastructure for mobility management of wireless users connected thereto, e.g. cellular networks, WLAN [Wireless Local Area Network], wireless access networks, e.g. WLL [Wireless Local Loop] or self-organising wireless communication networks, e.g. ad hoc networks;
  - planning or deployment specially adapted for the above-mentioned wireless networks;
  - services or facilities specially adapted for the above-mentioned wireless networks;
  - arrangements or techniques specially adapted for the operation of the above-mentioned wireless networks.
2. This subclass does not cover :
  - communication systems using wireless extensions, i.e. wireless links without selective communication, e.g. cordless telephones, which are covered by group [H04M 1/72](#);
  - broadcast communication, which is covered by subclass [H04H](#).

### WARNING

In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.

<b>4/00</b>	<b>Services specially adapted for wireless communication networks; Facilities therefor</b>	4/08	• . User group management
		4/10	• . Push-to-Talk [PTT] or Push-On-Call services
		4/12	• Messaging; Mailboxes; Announcements
		4/14	• . Short messaging services, e.g. short message services [SMS] or unstructured supplementary service data [USSD]
		4/16	• Communication-related supplementary services, e.g. call-transfer or call-hold
		4/18	• Information format or content conversion, e.g. adaptation by the network of the transmitted or received information for the purpose of wireless delivery to users or terminals
4/02	• Services making use of location information	4/185	• . {by embedding added-value information into content, e.g. geo-tagging}
4/021	• . Services related to particular areas, e.g. point of interest [POI] services, venue services or geofences	4/20	• Services signaling; Auxiliary data signalling, i.e. transmitting data via a non-traffic channel
4/022	• . . {with dynamic range variability}	4/203	• . {for converged personal network application service interworking, e.g. OMA converged personal network services [CPNS]}
4/023	• . {using mutual or relative location information between multiple location based services [LBS] targets or of distance thresholds}	4/21	• . for social networking applications
4/024	• . Guidance services	4/23	• . for mobile advertising
4/025	• . {using location based information parameters}	4/24	• Accounting or billing
4/026	• . . {using orientation information, e.g. compass}	4/30	• Services specially adapted for particular environments, situations or purposes
4/027	• . . {using movement velocity, acceleration information}	4/33	• . for indoor environments, e.g. buildings
4/029	• . Location-based management or tracking services	4/35	• . for the management of goods or merchandise
4/06	• Selective distribution of broadcast services, e.g. multimedia broadcast multicast service [MBMS]; Services to user groups; One-way selective calling services	4/38	• . for collecting sensor information
		4/40	• . for vehicles, e.g. vehicle-to-pedestrians [V2P]

4/42	. . . for mass transport vehicles, e.g. buses, trains or aircraft	8/30	. Network data restoration; {Network data reliability; Network data fault tolerance}
4/44	. . . for communication between vehicles and infrastructures, e.g. vehicle-to-cloud [V2C] or vehicle-to-home [V2H]	<b>12/00</b>	<b>Security arrangements; Authentication; Protecting privacy or anonymity</b>
4/46	. . . for vehicle-to-vehicle communication [V2V]	12/009	. {specially adapted for networks, e.g. wireless sensor networks, ad-hoc networks, RFID networks or cloud networks}
4/48	. . . for in-vehicle communication	12/02	. Protecting privacy or anonymity, e.g. protecting personally identifiable information [PII]
4/50	. Service provisioning or reconfiguring	12/03	. Protecting confidentiality, e.g. by encryption
4/60	. Subscription-based services using application servers or record carriers, e.g. SIM application toolkits	12/033	. . of the user plane, e.g. user's traffic
4/70	. Services for machine-to-machine communication [M2M] or machine type communication [MTC]	12/037	. . of the control plane, e.g. signalling traffic
4/80	. Services using short range communication, e.g. near-field communication [NFC], radio-frequency identification [RFID] or low energy communication	12/04	. Key management, e.g. using generic bootstrapping architecture [GBA]
4/90	. Services for handling of emergency or hazardous situations, e.g. earthquake and tsunami warning systems [ETWS]	12/041	. . Key generation or derivation
<b>8/00</b>	<b>Network data management</b>	12/043	. . using a trusted network node as an anchor
8/005	. {Discovery of network devices, e.g. terminals}	12/0431	. . . Key distribution or pre-distribution; Key agreement
8/02	. Processing of mobility data, e.g. registration information at HLR [Home Location Register] or VLR [Visitor Location Register]; Transfer of mobility data, e.g. between HLR, VLR or external networks	12/0433	. . . Key management protocols
8/04	. . Registration at HLR or HSS [Home Subscriber Server]	12/047	. . without using a trusted network node as an anchor
8/06	. . Registration at serving network Location Register, VLR or user mobility server	12/0471	. . . Key exchange
8/065	. . . {involving selection of the user mobility server}	12/06	. Authentication
8/08	. . Mobility data transfer	12/062	. . Pre-authentication
8/082	. . . {for traffic bypassing of mobility servers, e.g. location registers, home PLMNs or home agents}	12/065	. . Continuous authentication
8/085	. . . {involving hierarchical organized mobility servers, e.g. hierarchical mobile IP [HMIP]}	12/068	. . {using credential vaults, e.g. password manager applications or one time password [OTP] applications}
8/087	. . . {for preserving data network PoA address despite hand-offs}	12/069	. . using certificates or pre-shared keys
8/10	. . . between location register and external networks	12/08	. Access security
8/12	. . . between location registers or mobility servers	12/082	. . using revocation of authorisation
8/14	. . . between corresponding nodes	12/084	. . using delegated authorisation, e.g. open authorisation [OAuth] protocol
8/16	. . . selectively restricting mobility {data} tracking	12/086	. . using security domains
8/18	. Processing of user or subscriber data, e.g. subscribed services, user preferences or user profiles; Transfer of user or subscriber data	12/088	. . using filters or firewalls
8/183	. . {Processing at user equipment or user record carrier}	12/10	. Integrity
8/186	. . {Processing of subscriber group data}	12/102	. . Route integrity, e.g. using trusted paths
8/20	. . Transfer of user or subscriber data	12/104	. . Location integrity, e.g. secure geotagging
8/205	. . . {Transfer to or from user equipment or user record carrier}	12/106	. . Packet or message integrity
8/22	. Processing or transfer of terminal data, e.g. status or physical capabilities	12/108	. . Source integrity
8/24	. . Transfer of terminal data	12/12	. Detection or prevention of fraud
8/245	. . . {from a network towards a terminal}	12/121	. . Wireless intrusion detection systems [WIDS]; Wireless intrusion prevention systems [WIPS]
8/26	. Network addressing or numbering for mobility support	12/122	. . . Counter-measures against attacks; Protection against rogue devices
8/265	. . {for initial activation of new user}	12/125	. . Protection against power exhaustion attacks
8/28	. . Number portability {; Network address portability}	12/126	. . Anti-theft arrangements, e.g. protection against subscriber identity module [SIM] cloning
		12/128	. . Anti-malware arrangements, e.g. protection against SMS fraud or mobile malware
		12/30	. Security of mobile devices; Security of mobile applications
			<b><u>WARNING</u></b>
			Group <a href="#">H04W 12/30</a> is impacted by reclassification into group <a href="#">H04W 12/33</a> .
			Groups <a href="#">H04W 12/30</a> and <a href="#">H04W 12/33</a> should be considered in order to perform a complete search.

- 12/33 . . using wearable devices, e.g. using a smartwatch or smart-glasses
- WARNING**
- Group [H04W 12/33](#) is incomplete pending reclassification of documents from group [H04W 12/30](#).
- Groups [H04W 12/30](#) and [H04W 12/33](#) should be considered in order to perform a complete search.
- 12/35 . . {Protecting application or service provisioning, e.g. securing SIM application provisioning}
- 12/37 . . Managing security policies for mobile devices or for controlling mobile applications
- 12/40 . Security arrangements using identity modules
- 12/42 . . using virtual identity modules
- 12/43 . . using shared identity modules, e.g. SIM sharing
- 12/45 . . using multiple identity modules
- 12/47 . . using near field communication [NFC] or radio frequency identification [RFID] modules
- 12/48 . . using secure binding, e.g. securely binding identity modules to devices, services or applications
- 12/50 . Secure pairing of devices
- 12/55 . . involving three or more devices, e.g. group pairing
- 12/60 . Context-dependent security
- 12/61 . . Time-dependent
- 12/63 . . Location-dependent; Proximity-dependent
- WARNING**
- Group [H04W 12/63](#) is impacted by reclassification into group [H04W 12/64](#).
- Groups [H04W 12/63](#) and [H04W 12/64](#) should be considered in order to perform a complete search.
- 12/64 . . . using geofenced areas
- WARNING**
- Group [H04W 12/64](#) is incomplete pending reclassification of documents from group [H04W 12/63](#).
- Groups [H04W 12/63](#) and [H04W 12/64](#) should be considered in order to perform a complete search.
- 12/65 . . Environment-dependent, e.g. using captured environmental data
- 12/66 . . {Trust-dependent, e.g. using trust scores or trust relationships}
- 12/67 . . Risk-dependent, e.g. selecting a security level depending on risk profiles
- 12/68 . . Gesture-dependent or behaviour-dependent
- 12/69 . . Identity-dependent
- 12/71 . . . Hardware identity
- 12/72 . . . Subscriber identity
- 12/73 . . . Access point logical identity
- 12/75 . . . Temporary identity
- 12/76 . . . Group identity
- 12/77 . . . Graphical identity
- 12/79 . . . Radio fingerprint
- 12/80 . Arrangements enabling lawful interception [LI]

- 16/00 Network planning, e.g. coverage or traffic planning tools; Network deployment, e.g. resource partitioning or cells structures**
- 16/02 . Resource partitioning among network components, e.g. reuse partitioning
- 16/04 . . Traffic adaptive resource partitioning
- 16/06 . . Hybrid resource partitioning, e.g. channel borrowing
- 16/08 . . . Load shedding arrangements
- 16/10 . . Dynamic resource partitioning
- 16/12 . . Fixed resource partitioning
- 16/14 . Spectrum sharing arrangements {between different networks}
- 16/16 . . for PBS [Private Base Station] arrangements
- 16/18 . Network planning tools
- 16/20 . . for indoor coverage or short range network deployment
- 16/22 . Traffic simulation tools or models
- 16/225 . . {for indoor or short range network}
- 16/24 . Cell structures
- 16/26 . . Cell enhancers {or enhancement}, e.g. for tunnels, building shadow
- 16/28 . . using beam steering
- 16/30 . . Special cell shapes, e.g. doughnuts or ring cells
- 16/32 . . Hierarchical cell structures
- 24/00 Supervisory, monitoring or testing arrangements**
- 24/02 . Arrangements for optimising operational condition
- 24/04 . Arrangements for maintaining operational condition
- 24/06 . Testing, {supervising or monitoring} using simulated traffic
- 24/08 . Testing, {supervising or monitoring} using real traffic
- 24/10 . Scheduling measurement reports {; Arrangements for measurement reports}
- 28/00 Network traffic or resource management**
- 28/02 . Traffic management, e.g. flow control or congestion control
- 28/0205 . . {at the air interface (dynamic wireless traffic scheduling [H04W 72/12](#))}
- 28/021 . . {in wireless networks with changing topologies, e.g. ad-hoc networks (self-organizing networks [H04W 84/18](#))}
- 28/0215 . . {based on user or device properties, e.g. MTC-capable devices (services for machine-to-machine communication [M2M] or machine type communication [MTC] [H04W 4/70](#); wireless resource selection or allocation plan definition based on terminal or device properties [H04W 72/048](#))}
- 28/0221 . . . {power availability or consumption}
- 28/0226 . . {based on location or mobility (handoff or reselection [H04W 36/00](#); mobile application services making use of the location of users or terminals [H04W 4/02](#))}
- 28/0231 . . {based on communication conditions (dynamic wireless traffic scheduling definition based on channel quality criteria [H04W 72/1226](#))}
- 28/0236 . . . {radio quality, e.g. interference, losses or delay}
- 28/0242 . . . {Determining whether packet losses are due to overload or to deterioration of radio communication conditions}

- 28/0247 . . {based on conditions of the access network or the infrastructure network (central resource management [H04W 28/16](#))}
- 28/0252 . . {per individual bearer or channel (dynamic wireless traffic scheduling [H04W 72/12](#))}
- 28/0257 . . . {the individual bearer or channel having a maximum bit rate or a bit rate guarantee}
- 28/0263 . . . {involving mapping traffic to individual bearers or channels, e.g. traffic flow template [TFT]}
- 28/0268 . . {using specific QoS parameters for wireless networks, e.g. QoS class identifier [QCI] or guaranteed bit rate [GBR] (negotiating SLA or negotiating QoS [H04W 28/24](#))}
- 28/0273 . . {adapting protocols for flow control or congestion control to wireless environment, e.g. adapting transmission control protocol [TCP] (wireless network protocols or protocol adaptations to wireless operation, e.g. wireless application protocol [H04W 80/00](#))}
- 28/0278 . . {using buffer status reports (dynamic wireless traffic scheduling definition [H04W 72/1205](#))}
- 28/0284 . . {detecting congestion or overload during communication (monitoring arrangements [H04L 43/00](#))}
- 28/0289 . . {Congestion control (performing reselection for handling the traffic [H04W 36/22](#); load shedding arrangements in network planning [H04W 16/08](#); dynamic wireless traffic scheduling [H04W 72/12](#))}
- 28/0294 . . {forcing collision (non-scheduled or contention based wireless access channel [H04W 74/08](#))}
- 28/04 . . Error control

**NOTE**

When classifying in this group, classification is also made in the appropriate groups under [H04L 1/00](#).

- 28/06 . . Optimizing {the usage of the radio link}, e.g. header compression, information sizing {, discarding information (system modifying transmission characteristic according to link quality by modifying frame length [H04L 1/0007](#); dynamic adaptation of the packet size for flow control or congestion control [H04L 47/365](#))}
- 28/065 . . . {using assembly or disassembly of packets}
- 28/08 . . Load balancing or load distribution

**WARNING**

Group [H04W 28/08](#) is impacted by re-classification into groups [H04W 28/0804](#) - [H04W 28/0846](#) and groups [H04W 28/0858](#) - [H04W 28/0992](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 28/0804 . . . {between access entities (reselecting a network for handling traffic [H04W 36/22](#); wireless resource allocation where an allocation plan is defined based on load [H04W 72/0486](#))}

**WARNING**

Groups [H04W 28/0804](#) - [H04W 28/0823](#) are incomplete pending re-classification of documents from group [H04W 28/08](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 28/0808 . . . . {between base stations}
- 28/0812 . . . . {of same hierarchy level}
- 28/0815 . . . . {of different hierarchy levels, e.g. Master Evolved Node B [MeNB] or Secondary Evolved node B [SeNB]}
- 28/0819 . . . . {of different Radio Access Technologies [RATs], e.g. LTE or WiFi}
- 28/0823 . . . . {between wireless and wire-based access points, e.g. via LTE and via DSL connected access points}
- 28/0827 . . . {Triggering entity}

**WARNING**

Groups [H04W 28/0827](#) – [H04W 28/0838](#) are incomplete pending re-classification of documents from group [H04W 28/08](#).

All groups listed in this Warning should be considered in order to perform a complete search.

- 28/0831 . . . . {Core entity}
- 28/0835 . . . . {Access entity, e.g. eNB}
- 28/0838 . . . . {User device}
- 28/0842 . . . {among core entities}

**WARNING**

Group [H04W 28/0842](#) is incomplete pending re-classification of documents from group [H04W 28/08](#).

Groups [H04W 28/08](#) and [H04W 28/0842](#) should be considered in order to perform a complete search.

- 28/0846 . . . {between network providers, e.g. operators (selecting a network or a communication service [H04W 40/18](#))}

**WARNING**

Group [H04W 28/0846](#) is incomplete pending re-classification of documents from group [H04W 28/08](#).

Groups [H04W 28/08](#) and [H04W 28/0846](#) should be considered in order to perform a complete search.

- 28/085 . . . {among bearers or channels}

28/0858 . . . {among entities in the uplink}

**WARNING**

Group [H04W 28/0858](#) is incomplete pending re-classification of documents from group [H04W 28/08](#).

Groups [H04W 28/08](#) and [H04W 28/0858](#) should be considered in order to perform a complete search.

28/0867 . . . {among entities in the downlink}

**WARNING**

Group [H04W 28/0867](#) is incomplete pending re-classification of documents from group [H04W 28/08](#).

Groups [H04W 28/08](#) and [H04W 28/0867](#) should be considered in order to perform a complete search.

28/0875 . . . {to or through Device to Device [D2D] links, e.g. direct-mode links}

**WARNING**

Group [H04W 28/0875](#) is incomplete pending re-classification of documents from group [H04W 28/08](#).

Groups [H04W 28/08](#) and [H04W 28/0875](#) should be considered in order to perform a complete search.

28/0883 . . . {between entities in ad-hoc networks}

**WARNING**

Groups [H04W 28/0883](#) and [H04W 28/0892](#) are incomplete pending re-classification of documents from group [H04W 28/08](#).

Groups [H04W 28/08](#), [H04W 28/0883](#) and [H04W 28/0892](#) should be considered in order to perform a complete search.

28/0892 . . . {between different intermediate nodes}

28/09 . . . {Management thereof}

**WARNING**

Group [H04W 28/09](#) is incomplete pending re-classification of documents from group [H04W 28/08](#).

Groups [H04W 28/08](#) and [H04W 28/09](#) should be considered in order to perform a complete search.

28/0908 . . . {based on time, e.g. for a critical period only}

**WARNING**

Group [H04W 28/0908](#) is incomplete pending re-classification of documents from group [H04W 28/08](#).

Groups [H04W 28/08](#) and [H04W 28/0908](#) should be considered in order to perform a complete search.

28/0917 . . . {based on the energy state of entities}

**WARNING**

Group [H04W 28/0917](#) is incomplete pending re-classification of documents from group [H04W 28/08](#).

Groups [H04W 28/08](#) and [H04W 28/0917](#) should be considered in order to perform a complete search.

28/0925 . . . {using policies}

**WARNING**

Groups [H04W 28/0925](#) - [H04W 28/095](#) are incomplete pending re-classification of documents from group [H04W 28/08](#).

Groups [H04W 28/08](#) and [H04W 28/0925](#) should be considered in order to perform a complete search.

28/0933 . . . {based on load-splitting ratios}

28/0942 . . . {based on measured or predicted load of entities- or links}

28/095 . . . {based on usage history, e.g. usage history of devices}

28/0958 . . . {based on metrics or performance parameters}

**WARNING**

Groups [H04W 28/0958](#) – [H04W 28/0983](#) are incomplete pending re-classification of documents from group [H04W 28/08](#).

All groups listed in this Warning should be considered in order to perform a complete search.

28/0967 . . . {Quality of Service [QoS] parameters}

28/0975 . . . {for reducing delays}

28/0983 . . . {for optimizing bandwidth or throughput}

28/0992 . . . {based on the type of application}

**WARNING**

Group [H04W 28/0992](#) is incomplete pending re-classification of documents from group [H04W 28/08](#).

Groups [H04W 28/08](#) and [H04W 28/0992](#) should be considered in order to perform a complete search.

28/10 . . Flow control {between communication endpoints}

28/12 . . . using signalling between network elements

28/14 . . . using intermediate storage

28/16 . . Central resource management; Negotiation of resources or communication parameters, e.g. negotiating bandwidth or QoS [Quality of Service]

28/18 . . Negotiating wireless communication parameters

28/20 . . . Negotiating bandwidth

28/22 . . . Negotiating communication rate

28/24 . . Negotiating SLA [Service Level Agreement]; Negotiating QoS [Quality of Service]

28/26 . . Resource reservation



**36/00 Hand-off or reselection arrangements****NOTE**

In this group, local priority rules supersede the first-place priority rule (FPPR) applying throughout [H04W](#)

- 36/0005 . {Control or signalling for completing the hand-off}
- 36/0007 . . {for multicast or broadcast services, e.g. MBMS (multicast or broadcast application services [H04W 4/06](#); resource management for broadcast services [H04W 72/005](#); connection management for selective distribution or broadcast [H04W 76/40](#))}
- 36/0009 . . {for a plurality of users or terminals, e.g. group communication or moving wireless networks (user group management [H04W 4/08](#); processing of subscriber group data [H04W 8/186](#))}
- 36/0011 . . {for data session or connection}
- 36/0016 . . . {for hand-off preparation}
- 36/0022 . . . {for transferring sessions between adjacent core network technologies}
- 36/0027 . . . {for a plurality of sessions or connections, e.g. multi-call, multi-bearer connections}
- 36/0033 . . . {with transfer of context information}
- 36/0038 . . . . {of security context information}
- 36/0044 . . . . {of quality context information}
- 36/005 . . {involving radio access media independent information, e.g. MIH [[Media independent Hand-off](#)]}
- 36/0055 . . {Transmission and use of information for re-establishing the radio link}
- 36/0058 . . . {Transmission of hand-off measurement information, e.g. measurement reports}
- 36/0061 . . . {of neighbor cell information}
- 36/0066 . . . {of control information between different types of networks in order to establish a new radio link in the target network}
- 36/0069 . . . {in case of dual connectivity, e.g. CoMP, decoupled uplink/downlink or carrier aggregation (allocation of physical resources in CoMP or in carrier aggregation [H04L 5/0035](#))}
- 36/0072 . . . {of resource information of target access point}
- 36/0077 . . . {of access information of target access point}
- 36/0079 . . . {in case of hand-off failure or rejection}
- 36/0083 . . {Determination of parameters used for hand-off, e.g. generation or modification of neighbour cell lists}
- 36/00835 . . . {Determination of the neighbour cell list}
- 36/00837 . . . {Determination of triggering parameters for hand-off}
- 36/0085 . . . {Hand-off measurements}
- 36/0088 . . . . {Scheduling hand-off measurements}
- 36/0094 . . . . {Definition of hand-off measurement parameters}
- 36/02 . Buffering or recovering information during reselection {; Modification of the traffic flow during hand-off}
- 36/023 . . {Buffering or recovering information during reselection}
- 36/026 . . {Multicasting of data during hand-off}
- 36/03 . {Reselecting a link using a direct mode connection}
- 36/04 . Reselecting a cell layer in multi-layered cells

- 36/06 . Reselecting a communication resource in the serving access point
- 36/08 . Reselecting an access point
- 36/10 . Reselecting an access point controller
- 36/12 . Reselecting a serving backbone network switching or routing node
- 36/125 . . {involving different types of service backbone}
- 36/14 . Reselecting a network or an air interface
- 36/16 . Performing reselection for specific purposes
- 36/165 . . {for improving the overall network performance ([H04W 36/18](#) - [H04W 36/22](#) take precedence)}
- 36/18 . . for allowing seamless reselection, e.g. soft reselection
- 36/20 . . for optimising the interference level
- 36/22 . . for handling the traffic
- 36/24 . Reselection being triggered by specific parameters {used to improve the performance of a single terminal}
- 36/245 . . {by historical data}
- 36/26 . . by agreed or negotiated communication parameters
- 36/28 . . . involving a plurality of connections, e.g. multi-call, multi-bearer connections
- 36/30 . . by measured or perceived connection quality data
- 36/305 . . . {Reselection due to radio link failure (control signalling for hand-off failure [H04W 36/0079](#))}
- 36/32 . . by location or mobility data, e.g. speed data
- 36/34 . Reselection control
- 36/36 . . by user or terminal equipment
- 36/365 . . . {by manual user interaction}
- 36/38 . . by fixed network equipment
- 36/385 . . . {of the core network}
- 40/00 Communication routing or communication path finding**
- 40/005 . {Routing actions in the presence of nodes in sleep or doze mode}
- 40/02 . Communication route or path selection, e.g. power-based or shortest path routing
- 40/023 . . {Limited or focused flooding to selected areas of a network}
- 40/026 . . {Route selection considering the moving speed of individual devices}
- 40/04 . . based on wireless node resources
- 40/06 . . . based on characteristics of available antennas
- 40/08 . . . based on transmission power
- 40/10 . . . based on available power or energy
- 40/12 . . based on transmission quality or channel quality
- 40/125 . . . {using a measured number of retransmissions as a link metric}
- 40/14 . . . based on stability
- 40/16 . . . based on interference
- 40/18 . . based on predicted events
- 40/20 . . based on geographic position or location
- 40/205 . . . {using topographical information, e.g. hills, high rise buildings}
- 40/22 . . using selective relaying for reaching a BTS [Base Transceiver Station] or an access point
- 40/24 . Connectivity information management, e.g. connectivity discovery or connectivity update
- 40/242 . . {aging of topology database entries}
- 40/244 . . {using a network of reference devices, e.g. beaconing}

40/246	. . {Connectivity information discovery}	52/0241	. . . . {where no transmission is received, e.g. out of range of the transmitter}
40/248	. . {Connectivity information update}	52/0245	. . . . {according to signal strength}
40/26	. . for hybrid routing by combining proactive and reactive routing	52/0248	. . . . {dependent on the time of the day, e.g. according to expected transmission activity}
40/28	. . for reactive routing	52/0251	. . . . {using monitoring of local events, e.g. events related to user activity}
40/30	. . for proactive routing	52/0254	. . . . {detecting a user operation or a tactile contact or a motion of the device}
40/32	. . for defining a routing cluster membership	52/0258	. . . . {controlling an operation mode according to history or models of usage information, e.g. activity schedule or time of day}
40/34	. Modification of an existing route	52/0261	. . . . {managing power supply demand, e.g. depending on battery level}
40/36	. . due to handover	52/0264	. . . . {by selectively disabling software applications}
40/38	. . adapting due to varying relative distances between nodes	52/0267	. . . . {by controlling user interface components}
<b>48/00</b>	<b>Access restriction (access security to prevent unauthorised access <a href="#">H04W 12/08</a>); Network selection; Access point selection</b>	52/027	. . . . {by controlling a display operation or backlight unit}
48/02	. Access restriction performed under specific conditions	52/0274	. . . . {by switching on or off the equipment or parts thereof}
48/04	. . based on user or terminal location or mobility data, e.g. moving direction, speed	52/0277	. . . . {according to available power supply, e.g. switching off when a low battery condition is detected}
48/06	. . based on traffic conditions	52/028	. . . . {switching on or off only a part of the equipment circuit blocks}
48/08	. Access restriction or access information delivery, e.g. discovery data delivery ( <a href="#">signalling during connection <a href="#">H04W 76/00</a></a> )	52/0283	. . . . {with sequential power up or power down of successive circuit blocks, e.g. switching on the local oscillator before RF or mixer stages}
48/10	. . using broadcasted information	52/0287	. . . . {changing the clock frequency of a controller in the equipment}
48/12	. . using downlink control channel	52/029	. . . . {reducing the clock frequency of the controller}
48/14	. . using user query {or user detection}	52/0293	. . . . {having a sub-controller with a low clock frequency switching on and off a main controller with a high clock frequency}
48/16	. Discovering, processing access restriction or access information	52/0296	. . . . {switching to a backup power supply}
48/17	. {Selecting a data network PoA [Point of Attachment]}	52/04	. TPC
48/18	. Selecting a network or a communication service	52/06	. . TPC algorithms
48/20	. Selecting an access point	52/08	. . . Closed loop power control
<b>52/00</b>	<b>Power management, e.g. TPC [Transmission Power Control], power saving or power classes {(gain control in transmitters or power amplifiers <a href="#">H03G 3/3042</a>)}</b>	52/10	. . . Open loop power control
52/02	. Power saving arrangements {(in wired systems <a href="#">H04L 12/12</a> ; signaling of mobile application services, e.g. low battery notifications <a href="#">H04W 4/20</a> )}	52/12	. . . Outer and inner loops
52/0203	. . {in the radio access network or backbone network of wireless communication networks}	52/125	. . . . {cascaded outer loop power control}
52/0206	. . . {in access points, e.g. base stations (access point devices <a href="#">per se <a href="#">H04W 88/08</a></a> )}	52/14	. . . Separate analysis of uplink or downlink
52/0209	. . {in terminal devices (terminal devices <a href="#">per se <a href="#">H04W 88/02</a></a> )}	52/143	. . . . {Downlink power control}
52/0212	. . . {managed by the network, e.g. network or access point is master and terminal is slave}	52/146	. . . . {Uplink power control}
52/0216	. . . . {using a pre-established activity schedule, e.g. traffic indication frame}	52/16	. . . Deriving transmission power values from another channel
52/0219	. . . . {where the power saving management affects multiple terminals}	52/18	. . TPC being performed according to specific parameters
52/0222	. . . . {in packet switched networks}	52/20	. . . using error rate
52/0225	. . . {using monitoring of external events, e.g. the presence of a signal}	52/22	. . . taking into account previous information or commands
52/0229	. . . . {where the received signal is a wanted signal}	52/221	. . . . {using past power control commands}
52/0232	. . . . . {according to average transmission signal activity}	52/223	. . . . {predicting future states of the transmission}
52/0235	. . . . {where the received signal is a power saving command}	52/225	. . . . {Calculation of statistics, e.g. average, variance}
52/0238	. . . . {where the received signal is an unwanted signal, e.g. interference or idle signal}	52/226	. . . . {using past references to control power, e.g. look-up-table}
		52/228	. . . . {using past power values or information}
		52/24	. . . using SIR [Signal to Interference Ratio] or other wireless path parameters

52/241	. . . . {taking into account channel quality metrics, e.g. SIR, SNR, CIR, Eb/lo}	52/386	. . . {centralized, e.g. when the radio network controller or equivalent takes part in the power control}
52/242	. . . . {taking into account path loss}	52/40	. . . during macro-diversity or soft handoff
52/243	. . . . {taking into account interferences}	52/42	. . . in systems with time, space, frequency or polarisation diversity
52/244	. . . . {Interferences in heterogeneous networks, e.g. among macro and femto or pico cells or other sector / system interference [OSI]}	52/44	. . . in connection with interruption of transmission
52/245	. . . . {taking into account received signal strength}	52/46	. . . in multi hop networks, e.g. wireless relay networks
52/246	. . . . {where the output power of a terminal is based on a path parameter calculated in said terminal}	52/48	. . . during retransmission after error or non-acknowledgment
52/247	. . . . {where the output power of a terminal is based on a path parameter sent by another terminal}	52/50	. . . at the moment of starting communication in a multiple access environment
52/248	. . . . {where transmission power control commands are generated based on a path parameter}	52/52	. . using AGC [Automatic Gain Control] circuits or amplifiers
52/26	. . . using transmission rate or quality of service QoS [Quality of Service]	52/54	. . Signalisation aspects of the TPC commands, e.g. frame structure
52/262	. . . . {taking into account adaptive modulation and coding [AMC] scheme (AMC <a href="#">per se H04L 1/0001</a> )}	52/545	. . . {modifying TPC bits in special situations}
52/265	. . . . {taking into account the quality of service QoS}	52/56	. . . Detection of errors of TPC bits
52/267	. . . . {taking into account the information rate}	52/58	. . . Format of the TPC bits
52/28	. . . using user profile, e.g. mobile speed, priority or network state, e.g. standby, idle or non transmission	52/60	. . . using different transmission rates for TPC commands
52/281	. . . . {taking into account user or data type priority}	<b>56/00</b>	<b>Synchronisation arrangements</b>
52/282	. . . . {taking into account the speed of the mobile}	56/0005	. {synchronizing of arrival of multiple uplinks}
52/283	. . . . {Power depending on the position of the mobile}	56/001	. {Synchronization between nodes}
52/285	. . . . {taking into account the mobility of the user}	56/0015	. . {one node acting as a reference for the others}
52/286	. . . . {during data packet transmission, e.g. high speed packet access [HSPA]}	56/002	. . {Mutual synchronization}
52/287	. . . . {when the channel is in stand-by}	56/0025	. . {synchronizing potentially movable access points}
52/288	. . . . {taking into account the usage mode, e.g. hands-free, data transmission, telephone}	56/003	. {Arrangements to increase tolerance to errors in transmission or reception timing}
52/30	. . using constraints in the total amount of available transmission power	56/0035	. {detecting errors in frequency or phase}
52/32	. . . TPC of broadcast or control channels	56/004	. {compensating for timing error of reception due to propagation delay}
52/322	. . . . {Power control of broadcast channels}	56/0045	. . {compensating for timing error by altering transmission time}
52/325	. . . . {Power control of control or pilot channels}	56/005	. . {compensating for timing error by adjustment in the receiver}
52/327	. . . . {Power control of multicast channels}	56/0055	. {determining timing error of reception due to propagation delay}
52/34	. . . TPC management, i.e. sharing limited amount of power among users or channels or data types, e.g. cell loading	56/006	. . {using known positions of transmitter and receiver}
52/343	. . . . {taking into account loading or congestion level}	56/0065	. . {using measurement of signal travel time}
52/346	. . . . {distributing total power among users or channels}	56/007	. . . {Open loop measurement}
52/36	. . . with a discrete range or set of values, e.g. step size, ramping or offsets	56/0075	. . . . {based on arrival time vs. expected arrival time}
52/362	. . . . {Aspects of the step size}	56/008	. . . . . {detecting arrival of signal based on received raw signal}
52/365	. . . . {Power headroom reporting}	56/0085	. . . . . {detecting a given structure in the signal}
52/367	. . . . {Power values between minimum and maximum limits, e.g. dynamic range}	56/009	. . . {Closed loop measurements}
52/38	. . TPC being performed in particular situations	56/0095	. . {estimated based on signal strength}
52/383	. . . {power control in peer-to-peer links}	<b>60/00</b>	<b>Affiliation to network, e.g. registration; Terminating affiliation with the network, e.g. de-registration</b>
		60/005	. {Multiple registrations, e.g. multihoming}
		60/02	. by periodical registration
		60/04	. using triggered events
		60/06	. De-registration or detaching
		<b>64/00</b>	<b>Locating users or terminals {or network equipment} for network management purposes, e.g. mobility management</b>
		64/003	. {locating network equipment}



64/006	. {with additional information processing, e.g. for direction or speed determination}	72/12	. {Dynamic} Wireless traffic scheduling {; Dynamically scheduled allocation on shared channel}
<b>68/00</b>	<b>User notification, e.g. alerting and paging, for incoming communication, change of service or the like</b>	72/1205	. . {Schedule definition, set-up or creation}
68/005	. {Transmission of information for alerting of incoming communication}	72/121	. . . {for groups of terminals or users}
68/02	. Arrangements for increasing efficiency of notification or paging channel	72/1215	. . . {for collaboration of different radio technologies}
68/025	. . {Indirect paging}	72/1221	. . . {based on age of data to be sent}
68/04	. multi-step notification using statistical or historical mobility data	72/1226	. . . {based on channel quality criteria, e.g. channel state dependent scheduling}
68/06	. using multi-step notification by changing the notification area	72/1231	. . . . {using measured or perceived quality}
68/08	. using multi-step notification by increasing the notification area	72/1236	. . . . {using requested quality}
68/10	. using simulcast notification	72/1242	. . . {based on precedence or priority of the traffic information}
68/12	. Inter-network notification	72/1247	. . . {based on priority of the information source or recipient}
<b>72/00</b>	<b>Local resource management, e.g. wireless traffic scheduling or selection or allocation of wireless resources</b>	72/1252	. . . {based on load}
	<b>NOTE</b>	72/1257	. . . {based on resource usage policy}
	In this group, local priority rules supersede the first-place priority rule (FPPR) applying throughout <a href="#">H04W</a>	72/1263	. {Schedule usage, i.e. actual mapping of traffic onto schedule; Multiplexing of flows into one or several streams; Mapping aspects; Scheduled allocation}
72/005	. {Resource management for broadcast services}	72/1268	. . . {of uplink data flows}
72/02	. Selection of wireless resources by user or terminal	72/1273	. . . {of downlink data flows}
72/04	. Wireless resource allocation	72/1278	. {Transmission of control information for scheduling}
72/0406	. . {involving control information exchange between nodes}	72/1284	. . . {in the uplink, i.e. from terminal to network}
72/0413	. . . {in uplink direction of a wireless link, i.e. towards network}	72/1289	. . . {in the downlink, i.e. towards the terminal}
72/042	. . . {in downlink direction of a wireless link, i.e. towards terminal}	72/1294	. . . . {using a grant or specific channel <a href="#">(H04W 72/14 takes precedence)</a> }
72/0426	. . . {between access points}	72/14	. . using a grant {or specific} channel
72/0433	. . . {between access point and access point controlling device}	<b>74/00</b>	<b>Wireless channel access, e.g. scheduled or random access</b>
72/044	. . {where an allocation plan is defined based on the type of the allocated resource}	74/002	. {Transmission of channel access control information}
72/0446	. . . {the resource being a slot, sub-slot or frame}	74/004	. . {in the uplink, i.e. towards network}
72/0453	. . . {the resource being a frequency, carrier or frequency band}	74/006	. . {in the downlink, i.e. towards the terminal}
72/046	. . . {the resource being in the space domain, e.g. beams}	74/008	. . {with additional processing of random access related information at receiving side}
72/0466	. . . {the resource being a scrambling code}	74/02	. Hybrid access techniques
72/0473	. . . {the resource being transmission power}	74/04	. Scheduled {or contention-free} access <a href="#">(H04W 74/02 takes precedence)</a>
72/048	. . {where an allocation plan is defined based on terminal or device properties}	74/06	. . using polling
72/0486	. . {where an allocation plan is defined based on load}	74/08	. Non-scheduled {or contention based} access, e.g. random access, ALOHA, CSMA [Carrier Sense Multiple Access] <a href="#">(H04W 74/02 takes precedence)</a>
72/0493	. . {where an allocation plan is defined based on a resource usage policy}	74/0808	. . {using carrier sensing, e.g. as in CSMA}
72/06	. . {where an allocation plan is defined} based on a ranking criteria of the wireless resources	74/0816	. . . {carrier sensing with collision avoidance}
72/08	. . {where an allocation plan is defined} based on quality criteria	74/0825	. . . {carrier sensing with collision detection}
72/082	. . . {using the level of interference}	74/0833	. . {using a random access procedure}
72/085	. . . {using measured or perceived quality}	74/0841	. . . {with collision treatment}
72/087	. . . {using requested quality}	74/085	. . . . {collision avoidance}
72/10	. . {where an allocation plan is defined} based on priority criteria	74/0858	. . . . {collision detection}
		74/0866	. . {using a dedicated channel for access}
		74/0875	. . . {with assigned priorities based access}
		74/0883	. . . {for un-synchronized access}
		74/0891	. . . {for synchronized access}
		<b>76/00</b>	<b>Connection management</b>
		76/10	. Connection setup
		76/11	. . Allocation or use of connection identifiers
		76/12	. . Setup of transport tunnels
		76/14	. . Direct-mode setup

76/15	. . Setup of multiple wireless link connections	84/04	. . Large scale networks; Deep hierarchical networks
76/16	. . . Involving different core network technologies, e.g. a packet-switched [PS] bearer in combination with a circuit-switched [CS] bearer	84/042	. . . {Public Land Mobile systems, e.g. cellular systems}
76/18	. . Management of setup rejection or failure	84/045	. . . . {using private Base Stations, e.g. femto Base Stations, home Node B}
76/19	. . Connection re-establishment	84/047	. . . . {using dedicated repeater stations}
76/20	. Manipulation of established connections	84/06	. . . Airborne or Satellite Networks ( <a href="#">space-based or airborne stations H04B 7/185</a> )
76/22	. . Manipulation of transport tunnels	84/08	. . . Trunked mobile radio systems
76/23	. . Manipulation of direct-mode connections	84/10	. . Small scale networks; Flat hierarchical networks
76/25	. . Maintenance of established connections	84/105	. . . {PBS [Private Base Station] network ( <a href="#">H04W 84/12 - H04W 84/16 take precedence</a> )}
76/27	. . Transitions between radio resource control [RRC] states	84/12	. . . WLAN [Wireless Local Area Networks]
76/28	. . Discontinuous transmission [DTX]; Discontinuous reception [DRX]	84/14	. . . WLL [Wireless Local Loop]; RLL [Radio Local Loop]
76/30	. Connection release	84/16	. . . WPBX [Wireless Private Branch Exchange]
76/32	. . Release of transport tunnels	84/18	. Self-organising networks, e.g. ad-hoc networks or sensor networks
76/34	. . Selective release of ongoing connections	84/20	. . Master-slave {selection or change} arrangements
76/36	. . . for reassigning the resources associated with the released connections	84/22	. . with access to wired networks
76/38	. . triggered by timers	<b>88/00</b>	<b>Devices specially adapted for wireless communication networks, e.g. terminals, base stations or access point devices</b>
76/40	. for selective distribution or broadcast	88/005	. {Data network PoA devices}
76/45	. . for Push-to-Talk [PTT] or Push-to-Talk over cellular [PoC] services	88/02	. Terminal devices
76/50	. for emergency connections	88/021	. . {adapted for Wireless Local Loop operation}
<b>80/00</b>	<b>Wireless network protocols or protocol adaptations to wireless operation</b>	88/022	. . {Selective call receivers}
80/02	. Data link layer protocols	88/023	. . . {with message or information receiving capability}
80/04	. Network layer protocols, e.g. mobile IP [Internet Protocol]	88/025	. . . . {Selective call decoders}
80/045	. . {involving different protocol versions, e.g. MIPv4 and MIPv6}	88/026	. . . . {using digital address codes}
80/06	. Transport layer protocols, e.g. TCP [Transport Control Protocol] over wireless {(transmission control protocol/Internet protocol [TCP/IP] or user datagram protocol [UDP] <a href="#">H04L 69/16</a> )}	88/027	. . . . {using frequency address codes}
80/08	. Upper layer protocols {(network arrangements or communication protocols for networked applications <a href="#">H04L 67/00</a> )}	88/028	. . . . {using pulse address codes}
80/085	. . {involving different upper layer protocol versions, e.g. LCS - SUPL or WSN-SOA-WSDP}	88/04	. . adapted for relaying to or from another terminal or user
80/10	. . adapted for {application} session management, e.g. SIP [Session Initiation Protocol] {(connection management <a href="#">H04W 76/00</a> ; arrangements for session management <a href="#">H04L 67/14</a> )}	88/06	. . adapted for operation in multiple networks {or having at least two operational modes}, e.g. multi-mode terminals
80/12	. . Application layer protocols, e.g. WAP [Wireless Application Protocol]	88/08	. Access point devices
<b>84/00</b>	<b>Network topologies</b>	88/085	. . {Access point devices with remote components}
	<b>NOTE</b>	88/10	. . adapted for operation in multiple networks, e.g. multi-mode access points
	In this group, local priority rules supersede the first-place priority rule (FPPR) applying throughout <a href="#">H04W</a>	88/12	. Access point controller devices
84/005	. {Moving wireless networks}	88/14	. Backbone network devices
84/02	. Hierarchically pre-organised networks, e.g. paging networks, cellular networks, WLAN [Wireless Local Area Network] or WLL [Wireless Local Loop]	88/16	. Gateway arrangements
84/022	. . {One-way selective calling networks, e.g. wide area paging}	88/18	. Service support devices; Network management devices
84/025	. . . {with acknowledge back capability}	88/181	. . {Transcoding devices; Rate adaptation devices}
84/027	. . . {providing paging services}	88/182	. . {Network node acting on behalf of an other network entity, e.g. proxy}
		88/184	. . {Messaging devices, e.g. message centre}
		88/185	. . {Selective call encoders for paging networks, e.g. paging centre devices}
		88/187	. . . {using digital or pulse address codes}
		88/188	. . . {using frequency address codes}
		<b>92/00</b>	<b>Interfaces specially adapted for wireless communication networks</b>
		92/02	. Inter-networking arrangements
		92/04	. Interfaces between hierarchically different network devices
		92/045	. . {between access point and backbone network device}

## H04W

- 92/06 . . between gateways and public network devices
- 92/08 . . between user and terminal device
- 92/10 . . between terminal device and access point, i.e.  
wireless air interface
- 92/12 . . between access points and access point  
controllers
- 92/14 . . between access point controllers and backbone  
network device
- 92/16 . Interfaces between hierarchically similar devices
- 92/18 . . between terminal devices
- 92/20 . . between access points
- 92/22 . . between access point controllers
- 92/24 . . between backbone network devices
- 99/00 Subject matter not provided for in other groups of  
this subclass**