

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.

4/00	Services specially adapted for wireless communication networks; Facilities therefor	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]	12/00	Security arrangements; Authentication; Protecting privacy or anonymity
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
8/00	Network data management	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
		12/33	. . using wearable devices, e.g. using a smartwatch or smart-glasses
		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	<ul style="list-style-type: none"> using near field communication [NFC] or radio frequency identification [RFID] modules 	24/10	<ul style="list-style-type: none"> Scheduling measurement reports {; Arrangements for measurement reports}
12/48	<ul style="list-style-type: none"> using secure binding, e.g. securely binding identity modules to devices, services or applications 	28/00	Network traffic or resource management
12/50	<ul style="list-style-type: none"> Secure pairing of devices 	28/02	<ul style="list-style-type: none"> Traffic management, e.g. flow control or congestion control
12/55	<ul style="list-style-type: none"> involving three or more devices, e.g. group pairing 	28/0205	<ul style="list-style-type: none"> {at the air interface (dynamic wireless traffic scheduling H04W 72/12)}
12/60	<ul style="list-style-type: none"> Context-dependent security 	28/021	<ul style="list-style-type: none"> {in wireless networks with changing topologies, e.g. ad-hoc networks (self-organizing networks H04W 84/18)}
12/61	<ul style="list-style-type: none"> Time-dependent 	28/0215	<ul style="list-style-type: none"> {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 72/51)}
12/63	<ul style="list-style-type: none"> Location-dependent; Proximity-dependent 	28/0221	<ul style="list-style-type: none"> {power availability or consumption}
12/64	<ul style="list-style-type: none"> using geofenced areas 	28/0226	<ul style="list-style-type: none"> {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)}
12/65	<ul style="list-style-type: none"> Environment-dependent, e.g. using captured environmental data 	28/0231	<ul style="list-style-type: none"> {based on communication conditions (dynamic wireless traffic scheduling definition based on channel quality criteria H04W 72/54)}
12/66	<ul style="list-style-type: none"> {Trust-dependent, e.g. using trust scores or trust relationships} 	28/0236	<ul style="list-style-type: none"> {radio quality, e.g. interference, losses or delay}
12/67	<ul style="list-style-type: none"> Risk-dependent, e.g. selecting a security level depending on risk profiles 	28/0242	<ul style="list-style-type: none"> {Determining whether packet losses are due to overload or to deterioration of radio communication conditions}
12/68	<ul style="list-style-type: none"> Gesture-dependent or behaviour-dependent 	28/0247	<ul style="list-style-type: none"> {based on conditions of the access network or the infrastructure network (central resource management H04W 28/16)}
12/69	<ul style="list-style-type: none"> Identity-dependent 	28/0252	<ul style="list-style-type: none"> {per individual bearer or channel (dynamic wireless traffic scheduling H04W 72/12)}
12/71	<ul style="list-style-type: none"> Hardware identity 	28/0257	<ul style="list-style-type: none"> {the individual bearer or channel having a maximum bit rate or a bit rate guarantee}
12/72	<ul style="list-style-type: none"> Subscriber identity 	28/0263	<ul style="list-style-type: none"> {involving mapping traffic to individual bearers or channels, e.g. traffic flow template [TFT]}
12/73	<ul style="list-style-type: none"> Access point logical identity 	28/0268	<ul style="list-style-type: none"> {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)}
12/75	<ul style="list-style-type: none"> Temporary identity 	28/0273	<ul style="list-style-type: none"> {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)}
12/76	<ul style="list-style-type: none"> Group identity 	28/0278	<ul style="list-style-type: none"> {using buffer status reports (dynamic wireless traffic scheduling definition H04W 72/12)}
12/77	<ul style="list-style-type: none"> Graphical identity 	28/0284	<ul style="list-style-type: none"> {detecting congestion or overload during communication (monitoring arrangements H04L 43/00)}
12/79	<ul style="list-style-type: none"> Radio fingerprint 	28/0289	<ul style="list-style-type: none"> {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)}
12/80	<ul style="list-style-type: none"> Arrangements enabling lawful interception [LI] 	28/0294	<ul style="list-style-type: none"> {forcing collision (non-scheduled or contention based wireless access channel H04W 74/08)}
16/00	Network planning, e.g. coverage or traffic planning tools; Network deployment, e.g. resource partitioning or cells structures		
16/02	<ul style="list-style-type: none"> Resource partitioning among network components, e.g. reuse partitioning 		
16/04	<ul style="list-style-type: none"> Traffic adaptive resource partitioning 		
16/06	<ul style="list-style-type: none"> Hybrid resource partitioning, e.g. channel borrowing 		
16/08	<ul style="list-style-type: none"> Load shedding arrangements 		
16/10	<ul style="list-style-type: none"> Dynamic resource partitioning 		
16/12	<ul style="list-style-type: none"> Fixed resource partitioning 		
16/14	<ul style="list-style-type: none"> Spectrum sharing arrangements {between different networks} 		
16/16	<ul style="list-style-type: none"> for PBS [Private Base Station] arrangements 		
16/18	<ul style="list-style-type: none"> Network planning tools 		
16/20	<ul style="list-style-type: none"> for indoor coverage or short range network deployment 		
16/22	<ul style="list-style-type: none"> Traffic simulation tools or models 		
16/225	<ul style="list-style-type: none"> {for indoor or short range network} 		
16/24	<ul style="list-style-type: none"> Cell structures 		
16/26	<ul style="list-style-type: none"> Cell enhancers {or enhancement}, e.g. for tunnels, building shadow 		
16/28	<ul style="list-style-type: none"> using beam steering 		
16/30	<ul style="list-style-type: none"> Special cell shapes, e.g. doughnuts or ring cells 		
16/32	<ul style="list-style-type: none"> Hierarchical cell structures 		
24/00	Supervisory, monitoring or testing arrangements		
24/02	<ul style="list-style-type: none"> Arrangements for optimising operational condition 		
24/04	<ul style="list-style-type: none"> Arrangements for maintaining operational condition 		
24/06	<ul style="list-style-type: none"> Testing, {supervising or monitoring} using simulated traffic 		
24/08	<ul style="list-style-type: none"> Testing, {supervising or monitoring} using real traffic 		

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 72/52](#))}

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 72/30](#); 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}	40/04	. . . based on wireless node resources
36/0077	. . . {of access information of target access point}	40/06	. . . based on characteristics of available antennas
36/0079	. . . {in case of hand-off failure or rejection}	40/08	. . . based on transmission power
36/0083	. . {Determination of parameters used for hand-off, e.g. generation or modification of neighbour cell lists}	40/10	. . . based on available power or energy
36/00835	. . . {Determination of the neighbour cell list}	40/12	. . . based on transmission quality or channel quality
36/00837	. . . {Determination of triggering parameters for hand-off}	40/125	. . . {using a measured number of retransmissions as a link metric}
36/0085	. . . {Hand-off measurements}	40/14	. . . based on stability
36/0088	. . . . {Scheduling hand-off measurements}	40/16	. . . based on interference
36/0094	. . . . {Definition of hand-off measurement parameters}	40/18	. . . based on predicted events
36/02	. Buffering or recovering information during reselection ; Modification of the traffic flow during hand-off}	40/20	. . . based on geographic position or location
36/023	. . {Buffering or recovering information during reselection}	40/205	. . . {using topographical information, e.g. hills, high rise buildings}
36/026	. . {Multicasting of data during hand-off}	40/22	. . using selective relaying for reaching a BTS [Base Transceiver Station] or an access point
36/03	. {Reselecting a link using a direct mode connection}	40/24	. Connectivity information management, e.g. connectivity discovery or connectivity update
36/04	. Reselecting a cell layer in multi-layered cells	40/242	. . {aging of topology database entries}
36/06	. Reselecting a communication resource in the serving access point	40/244	. . {using a network of reference devices, e.g. beaconing}
36/08	. Reselecting an access point	40/246	. . {Connectivity information discovery}
36/10	. Reselecting an access point controller	40/248	. . {Connectivity information update}
36/12	. Reselecting a serving backbone network switching or routing node	40/26	. . for hybrid routing by combining proactive and reactive routing
36/125	. . {involving different types of service backbone}	40/28	. . for reactive routing
36/14	. Reselecting a network or an air interface	40/30	. . for proactive routing
36/16	. Performing reselection for specific purposes	40/32	. . for defining a routing cluster membership
36/165	. . {for improving the overall network performance (H04W 36/18 - H04W 36/22 take precedence)}	40/34	. Modification of an existing route
36/18	. . for allowing seamless reselection, e.g. soft reselection	40/36	. . due to handover
36/20	. . for optimising the interference level	40/38	. . adapting due to varying relative distances between nodes
36/22	. . for handling the traffic	48/00	Access restriction (access security to prevent unauthorised access H04W 12/08); Network selection; Access point selection
36/24	. Reselection being triggered by specific parameters {used to improve the performance of a single terminal}	48/02	. Access restriction performed under specific conditions
36/245	. . {by historical data}	48/04	. . based on user or terminal location or mobility data, e.g. moving direction, speed
36/26	. . by agreed or negotiated communication parameters	48/06	. . based on traffic conditions
36/28	. . . involving a plurality of connections, e.g. multi-call, multi-bearer connections	48/08	. Access restriction or access information delivery, e.g. discovery data delivery (signalling during connection H04W 76/00)
36/30	. . by measured or perceived connection quality data	48/10	. . using broadcasted information
36/305	. . . {Reselection due to radio link failure (control signalling for hand-off failure H04W 36/0079)}	48/12	. . using downlink control channel
36/32	. . by location or mobility data, e.g. speed data	48/14	. . using user query {or user detection}
36/34	. Reselection control	48/16	. Discovering, processing access restriction or access information
36/36	. . by user or terminal equipment	48/17	. {Selecting a data network PoA [Point of Attachment]}
36/365	. . . {by manual user interaction}	48/18	. Selecting a network or a communication service
36/38	. . by fixed network equipment	48/20	. Selecting an access point
36/385	. . . {of the core network}	52/00	Power management, e.g. TPC [Transmission Power Control], power saving or power classes {(gain control in transmitters or power amplifiers H03G 3/3042)}
40/00	Communication routing or communication path finding	52/02	. Power saving arrangements {(in wired systems H04L 12/12; signaling of mobile application services, e.g. low battery notifications H04W 4/20)}
40/005	. {Routing actions in the presence of nodes in sleep or doze mode}	52/0203	. . {in the radio access network or backbone network of wireless communication networks}
40/02	. Communication route or path selection, e.g. power-based or shortest path routing	52/0206	. . . {in access points, e.g. base stations (access point devices per se H04W 88/08)}
40/023	. . {Limited or focused flooding to selected areas of a network}		
40/026	. . {Route selection considering the moving speed of individual devices}		

52/0209	. . . {in terminal devices (terminal devices per se H04W 88/02)}	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}
52/0241	. . . . {where no transmission is received, e.g. out of range of the transmitter}	52/228	. . . . {using past power values or information}
52/0245	. . . . {according to signal strength}	52/24	. . . using SIR [Signal to Interference Ratio] or other wireless path parameters
52/0248	. . . . {dependent on the time of the day, e.g. according to expected transmission activity}	52/241	. . . . {taking into account channel quality metrics, e.g. SIR, SNR, CIR, Eb/Io}
52/0251	. . . {using monitoring of local events, e.g. events related to user activity}	52/242	. . . . {taking into account path loss}
52/0254	. . . . {detecting a user operation or a tactile contact or a motion of the device}	52/243	. . . . {taking into account interferences}
52/0258	. . . . {controlling an operation mode according to history or models of usage information, e.g. activity schedule or time of day}	52/244	. . . . . {Interferences in heterogeneous networks, e.g. among macro and femto or pico cells or other sector / system interference [OSI]}
52/0261	. . . {managing power supply demand, e.g. depending on battery level}	52/245	. . . . {taking into account received signal strength}
52/0264	. . . . {by selectively disabling software applications}	52/246	. . . . {where the output power of a terminal is based on a path parameter calculated in said terminal}
52/0267	. . . . {by controlling user interface components}	52/247	. . . . {where the output power of a terminal is based on a path parameter sent by another terminal}
52/027	. . . . . {by controlling a display operation or backlight unit}	52/248	. . . . {where transmission power control commands are generated based on a path parameter}
52/0274	. . . . {by switching on or off the equipment or parts thereof}	52/26	. . . using transmission rate or quality of service QoS [Quality of Service]
52/0277	. . . . . {according to available power supply, e.g. switching off when a low battery condition is detected}	52/262	. . . . {taking into account adaptive modulation and coding [AMC] scheme (AMC per se H04L 1/0001)}
52/028	. . . . . {switching on or off only a part of the equipment circuit blocks}	52/265	. . . . {taking into account the quality of service QoS}
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}	52/267	. . . . {taking into account the information rate}
52/0287	. . . . {changing the clock frequency of a controller in the equipment}	52/28	. . . using user profile, e.g. mobile speed, priority or network state, e.g. standby, idle or non transmission
52/029	. . . . . {reducing the clock frequency of the controller}	52/281	. . . . {taking into account user or data type priority}
52/0293	. . . . . {having a sub-controller with a low clock frequency switching on and off a main controller with a high clock frequency}	52/282	. . . . {taking into account the speed of the mobile}
52/0296	. . . . {switching to a backup power supply}	52/283	. . . . {Power depending on the position of the mobile}
52/04	. TPC	52/285	. . . . {taking into account the mobility of the user}
52/06	. . TPC algorithms	52/286	. . . . {during data packet transmission, e.g. high speed packet access [HSPA]}
52/08	. . . Closed loop power control	52/287	. . . . {when the channel is in stand-by}
52/10	. . . Open loop power control	52/288	. . . . {taking into account the usage mode, e.g. hands-free, data transmission, telephone}
52/12	. . . Outer and inner loops	52/30	. . using constraints in the total amount of available transmission power
52/125	. . . . {cascaded outer loop power control}	52/32	. . . TPC of broadcast or control channels
52/14	. . . Separate analysis of uplink or downlink	52/322	. . . . {Power control of broadcast channels}
		52/325	. . . . {Power control of control or pilot channels}

52/327	. . . . {Power control of multicast channels}	56/008	. . . . . {detecting arrival of signal based on received raw signal}
52/34	. . . TPC management, i.e. sharing limited amount of power among users or channels or data types, e.g. cell loading	56/0085	. . . . . {detecting a given structure in the signal}
52/343	. . . . {taking into account loading or congestion level}	56/009	. . . {Closed loop measurements}
52/346	. . . . {distributing total power among users or channels}	56/0095	. . {estimated based on signal strength}
52/36	. . . with a discrete range or set of values, e.g. step size, ramping or offsets	60/00	Affiliation to network, e.g. registration; Terminating affiliation with the network, e.g. de-registration
52/362	. . . . {Aspects of the step size}	60/005	. {Multiple registrations, e.g. multihoming}
52/365	. . . . {Power headroom reporting}	60/02	. by periodical registration
52/367	. . . . {Power values between minimum and maximum limits, e.g. dynamic range}	60/04	. using triggered events
52/38	. . TPC being performed in particular situations	60/06	. De-registration or detaching
52/383	. . . {power control in peer-to-peer links}	64/00	Locating users or terminals {or network equipment} for network management purposes, e.g. mobility management
52/386	. . . {centralized, e.g. when the radio network controller or equivalent takes part in the power control}	64/003	. {locating network equipment}
52/40	. . . during macro-diversity or soft handoff	64/006	. {with additional information processing, e.g. for direction or speed determination}
52/42	. . . in systems with time, space, frequency or polarisation diversity	68/00	User notification, e.g. alerting and paging, for incoming communication, change of service or the like
52/44	. . . in connection with interruption of transmission	68/005	. {Transmission of information for alerting of incoming communication}
52/46	. . . in multi hop networks, e.g. wireless relay networks	68/02	. Arrangements for increasing efficiency of notification or paging channel
52/48	. . . during retransmission after error or non-acknowledgment	68/025	. . {Indirect paging}
52/50	. . . at the moment of starting communication in a multiple access environment	68/04	. multi-step notification using statistical or historical mobility data
52/52	. . using AGC [Automatic Gain Control] circuits or amplifiers	68/06	. using multi-step notification by changing the notification area
52/54	. . Signalisation aspects of the TPC commands, e.g. frame structure	68/08	. using multi-step notification by increasing the notification area
52/545	. . . {modifying TPC bits in special situations}	68/10	. using simulcast notification
52/56	. . . Detection of errors of TPC bits	68/12	. Inter-network notification
52/58	. . . Format of the TPC bits	72/00	Local resource management
52/60	. . . using different transmission rates for TPC commands	72/02	. Selection of wireless resources by user or terminal
56/00	Synchronisation arrangements	WARNING	
56/0005	. {synchronizing of arrival of multiple uplinks}		Group H04W 72/02 is impacted by reclassification into group H04W 72/40 .
56/001	. {Synchronization between nodes}		Groups H04W 72/02 and H04W 72/40 should be considered in order to perform a complete search.
56/0015	. . {one node acting as a reference for the others}		
56/002	. . {Mutual synchronization}		
56/0025	. . {synchronizing potentially movable access points}		
56/003	. {Arrangements to increase tolerance to errors in transmission or reception timing}	72/04	. Wireless resource allocation
56/0035	. {detecting errors in frequency or phase}	WARNING	
56/004	. {compensating for timing error of reception due to propagation delay}		Group H04W 72/04 is impacted by reclassification into groups H04W 72/11 , H04W 72/115 and H04W 72/40 .
56/0045	. . {compensating for timing error by altering transmission time}		All groups listed in this Warning should be considered in order to perform a complete search.
56/005	. . {compensating for timing error by adjustment in the receiver}		
56/0055	. {determining timing error of reception due to propagation delay}	72/044	. . based on the type of the allocated resource
56/006	. . {using known positions of transmitter and receiver}	WARNING	
56/0065	. . {using measurement of signal travel time}		Group H04W 72/044 is impacted by reclassification into group H04W 72/0457 .
56/007	. . . {Open loop measurement}		Groups H04W 72/044 and H04W 72/0457 should be considered in order to perform a complete search.
56/0075	. . . . {based on arrival time vs. expected arrival time}		

- 72/0446 . . . Resources in time domain, e.g. slots or frames
- 72/0453 . . . Resources in frequency domain, e.g. a carrier in FDMA
- 72/0457 . . . Variable allocation of band or rate

WARNING

Group [H04W 72/0457](#) is incomplete pending reclassification of documents from group [H04W 72/044](#).

Groups [H04W 72/044](#) and [H04W 72/0457](#) should be considered in order to perform a complete search.

- 72/046 . . . {the resource being in the space domain, e.g. beams}
- 72/0466 . . . {the resource being a scrambling code}
- 72/0473 . . . {the resource being transmission power}
- 72/11 . . Semi-persistent scheduling

WARNING

Group [H04W 72/11](#) is incomplete pending reclassification of documents from group [H04W 72/04](#).

Groups [H04W 72/04](#) and [H04W 72/11](#) should be considered in order to perform a complete search.

- 72/115 . . Grant-free or autonomous transmission

WARNING

Group [H04W 72/115](#) is incomplete pending reclassification of documents from group [H04W 72/04](#).

Groups [H04W 72/04](#) and [H04W 72/115](#) should be considered in order to perform a complete search.

- 72/12 . Wireless traffic scheduling

WARNING

Group [H04W 72/12](#) is impacted by reclassification into groups [H04W 72/40](#), [H04W 72/50](#), [H04W 72/51](#) and [H04W 72/512](#).

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

- 72/121 . . for groups of terminals or users
- 72/1215 . . {for collaboration of different radio technologies}
- 72/1221 . . {based on age of data to be sent}
- 72/1263 . . Mapping of traffic onto schedule, e.g. scheduled allocation or multiplexing of flows
- 72/1268 . . . of uplink data flows
- 72/1273 . . . of downlink data flows
- 72/20 . Control channels or signalling for resource management

WARNING

Group [H04W 72/20](#) is impacted by reclassification into groups [H04W 72/25](#), [H04W 72/27](#) and [H04W 72/29](#).

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

- 72/21 . . in the uplink direction of a wireless link, i.e. towards the network
- 72/23 . . in the downlink direction of a wireless link, i.e. towards a terminal

WARNING

Group [H04W 72/23](#) is impacted by reclassification into groups [H04W 72/231](#) and [H04W 72/232](#).

Groups [H04W 72/23](#), [H04W 72/231](#) and [H04W 72/232](#) should be considered in order to perform a complete search.

- 72/231 . . . the control data signalling from the layers above the physical layer, e.g. RRC or MAC-CE signalling

WARNING

Group [H04W 72/231](#) is incomplete pending reclassification of documents from group [H04W 72/23](#).

Groups [H04W 72/23](#) and [H04W 72/231](#) should be considered in order to perform a complete search.

- 72/232 . . . the control data signalling from the physical layer, e.g. DCI signalling

WARNING

Group [H04W 72/232](#) is incomplete pending reclassification of documents from group [H04W 72/23](#).

Groups [H04W 72/23](#) and [H04W 72/232](#) should be considered in order to perform a complete search.

- 72/25 . . between terminals via a wireless link, e.g. sidelink

WARNING

Group [H04W 72/25](#) is incomplete pending reclassification of documents from group [H04W 72/20](#).

Groups [H04W 72/20](#) and [H04W 72/25](#) should be considered in order to perform a complete search.

- 72/27 . . between access points

WARNING

Group [H04W 72/27](#) is incomplete pending reclassification of documents from group [H04W 72/20](#).

Groups [H04W 72/20](#) and [H04W 72/27](#) should be considered in order to perform a complete search.

72/29	<ul style="list-style-type: none"> between an access point and the access point controlling device <p>WARNING</p> <p>Group H04W 72/29 is incomplete pending reclassification of documents from group H04W 72/20.</p> <p>Groups H04W 72/20 and H04W 72/29 should be considered in order to perform a complete search.</p>	72/54	<ul style="list-style-type: none"> based on quality criteria <p>WARNING</p> <p>Group H04W 72/54 is impacted by reclassification into group H04W 72/541.</p> <p>Groups H04W 72/54 and H04W 72/541 should be considered in order to perform a complete search.</p>
72/30	<ul style="list-style-type: none"> Resource management for broadcast services 	72/541	<ul style="list-style-type: none"> using the level of interference <p>WARNING</p> <p>Group H04W 72/541 is incomplete pending reclassification of documents from group H04W 72/54.</p> <p>Groups H04W 72/54 and H04W 72/541 should be considered in order to perform a complete search.</p>
72/40	<ul style="list-style-type: none"> Resource management for direct mode communication, e.g. D2D or sidelink <p>WARNING</p> <p>Group H04W 72/40 is incomplete pending reclassification of documents from groups H04W 72/02, H04W 72/04 and H04W 72/12.</p> <p>All groups listed in this Warning should be considered in order to perform a complete search.</p>	72/542	<ul style="list-style-type: none"> using measured or perceived quality
		72/543	<ul style="list-style-type: none"> based on requested quality, e.g. QoS
		72/56	<ul style="list-style-type: none"> based on priority criteria <p>WARNING</p> <p>Group H04W 72/56 is impacted by reclassification into group H04W 72/566.</p> <p>Groups H04W 72/56 and H04W 72/566 should be considered in order to perform a complete search.</p>
72/50	<ul style="list-style-type: none"> Allocation or scheduling criteria for wireless resources <p>WARNING</p> <p>Group H04W 72/50 is incomplete pending reclassification of documents from group H04W 72/12.</p> <p>Groups H04W 72/12 and H04W 72/50 should be considered in order to perform a complete search.</p>	72/563	<ul style="list-style-type: none"> of the wireless resources
		72/566	<ul style="list-style-type: none"> of the information or information source or recipient <p>WARNING</p> <p>Group H04W 72/566 is incomplete pending reclassification of documents from group H04W 72/56.</p> <p>Groups H04W 72/56 and H04W 72/566 should be considered in order to perform a complete search.</p>
72/51	<ul style="list-style-type: none"> based on terminal or device properties <p>WARNING</p> <p>Group H04W 72/51 is incomplete pending reclassification of documents from group H04W 72/12.</p> <p>Group H04W 72/51 is also impacted by reclassification into group H04W 72/512.</p> <p>Groups H04W 72/12, H04W 72/51 and H04W 72/512 should be considered in order to perform a complete search.</p>	72/569	<ul style="list-style-type: none"> {of the traffic information}
		74/00	Wireless channel access, e.g. scheduled or random access
72/512	<ul style="list-style-type: none"> for low-latency requirements, e.g. URLLC <p>WARNING</p> <p>Group H04W 72/512 is incomplete pending reclassification of documents from groups H04W 72/12 and H04W 72/51.</p> <p>Groups H04W 72/12, H04W 72/51 and H04W 72/512 should be considered in order to perform a complete search.</p>	74/002	<ul style="list-style-type: none"> {Transmission of channel access control information}
		74/004	<ul style="list-style-type: none"> {in the uplink, i.e. towards network}
		74/006	<ul style="list-style-type: none"> {in the downlink, i.e. towards the terminal}
		74/008	<ul style="list-style-type: none"> {with additional processing of random access related information at receiving side}
		74/02	<ul style="list-style-type: none"> Hybrid access techniques
		74/04	<ul style="list-style-type: none"> Scheduled {or contention-free} access (H04W 74/02 takes precedence)
		74/06	<ul style="list-style-type: none"> using polling
		74/08	<ul style="list-style-type: none"> Non-scheduled {or contention based} access, e.g. random access, ALOHA, CSMA [Carrier Sense Multiple Access] (H04W 74/02 takes precedence)
72/52	<ul style="list-style-type: none"> based on load 	74/0808	<ul style="list-style-type: none"> {using carrier sensing, e.g. as in CSMA}
72/53	<ul style="list-style-type: none"> based on regulatory allocation policies 	74/0816	<ul style="list-style-type: none"> {carrier sensing with collision avoidance}
72/535	<ul style="list-style-type: none"> {based on resource usage policies} 	74/0825	<ul style="list-style-type: none"> {carrier sensing with collision detection}
		74/0833	<ul style="list-style-type: none"> {using a random access procedure}
		74/0841	<ul style="list-style-type: none"> {with collision treatment}
		74/085	<ul style="list-style-type: none"> {collision avoidance}
		74/0858	<ul style="list-style-type: none"> {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}
76/00	Connection management
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
76/16	. . . Involving different core network technologies, e.g. a packet-switched [PS] bearer in combination with a circuit-switched [CS] bearer
76/18	. . Management of setup rejection or failure
76/19	. . Connection re-establishment
76/20	. Manipulation of established connections
76/22	. . Manipulation of transport tunnels
76/23	. . Manipulation of direct-mode connections
76/25	. . Maintenance of established connections
76/27	. . Transitions between radio resource control [RRC] states
76/28	. . Discontinuous transmission [DTX]; Discontinuous reception [DRX]
76/30	. Connection release
76/32	. . Release of transport tunnels
76/34	. . Selective release of ongoing connections
76/36	. . . for reassigning the resources associated with the released connections
76/38	. . triggered by timers
76/40	. for selective distribution or broadcast
76/45	. . for Push-to-Talk [PTT] or Push-to-Talk over cellular [PoC] services
76/50	. for emergency connections
80/00	Wireless network protocols or protocol adaptations to wireless operation
80/02	. Data link layer protocols
80/04	. Network layer protocols, e.g. mobile IP [Internet Protocol]
80/045	. . {involving different protocol versions, e.g. MIPv4 and MIPv6}
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] H04L 69/16)}
80/08	. Upper layer protocols {(network arrangements or communication protocols for networked applications H04L 67/00)}
80/085	. . {involving different upper layer protocol versions, e.g. LCS - SUPL or WSN-SOA-WSDP}
80/10	. . adapted for {application} session management, e.g. SIP [Session Initiation Protocol] {(connection management H04W 76/00; arrangements for session management H04L 67/14)}
80/12	. . Application layer protocols, e.g. WAP [Wireless Application Protocol]

84/00 Network topologies**NOTE**

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

84/005	. {Moving wireless networks}
84/02	. Hierarchically pre-organised networks, e.g. paging networks, cellular networks, WLAN [Wireless Local Area Network] or WLL [Wireless Local Loop]
84/022	. . {One-way selective calling networks, e.g. wide area paging}
84/025	. . . {with acknowledge back capability}
84/027	. . . {providing paging services}
84/04	. . Large scale networks; Deep hierarchical networks
84/042	. . . {Public Land Mobile systems, e.g. cellular systems}
84/045	. . . . {using private Base Stations, e.g. femto Base Stations, home Node B}
84/047	. . . . {using dedicated repeater stations}
84/06	. . . Airborne or Satellite Networks (space-based or airborne stations H04B 7/185)
84/08	. . . Trunked mobile radio systems
84/10	. . Small scale networks; Flat hierarchical networks
84/105	. . . {PBS [Private Base Station] network (H04W 84/12 - H04W 84/16 take precedence)}
84/12	. . . WLAN [Wireless Local Area Networks]
84/14	. . . WLL [Wireless Local Loop]; RLL [Radio Local Loop]
84/16	. . . WPBX [Wireless Private Branch Exchange]
84/18	. Self-organising networks, e.g. ad-hoc networks or sensor networks
84/20	. . Master-slave {selection or change} arrangements
84/22	. . with access to wired networks
88/00	Devices specially adapted for wireless communication networks, e.g. terminals, base stations or access point devices
88/005	. {Data network PoA devices}
88/02	. Terminal devices
88/021	. . {adapted for Wireless Local Loop operation}
88/022	. . {Selective call receivers}
88/023	. . . {with message or information receiving capability}
88/025	. . . . {Selective call decoders}
88/026	. . . . {using digital address codes}
88/027	. . . . {using frequency address codes}
88/028	. . . . {using pulse address codes}
88/04	. . adapted for relaying to or from another terminal or user
88/06	. . adapted for operation in multiple networks {or having at least two operational modes}, e.g. multi-mode terminals
88/08	. Access point devices
88/085	. . {Access point devices with remote components}
88/10	. . adapted for operation in multiple networks, e.g. multi-mode access points
88/12	. Access point controller devices
88/14	. Backbone network devices
88/16	. Gateway arrangements
88/18	. Service support devices; Network management devices

- 88/181 . . {Transcoding devices; Rate adaptation devices}
- 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}

92/00 Interfaces specially adapted for wireless communication networks

- 92/02 . Inter-networking arrangements
- 92/04 . Interfaces between hierarchically different network devices
- 92/045 . . {between access point and backbone network device}
- 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