

ECLA**EUROPEAN CLASSIFICATION****H04W**

WIRELESS COMMUNICATIONS NETWORKS (radio transmission systems [H04B7/00](#); transmission systems using electromagnetic waves other than radio waves, e.g. light, infrared [H04B10/00](#); communication systems using wireless extensions, i.e. wireless links without selective communication, e.g. cordless telephones [H04M1/72](#); broadcast communication H04H) [[N0407](#)] [[C0803](#)]

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 [H04M1/72](#);
 - broadcast communication, which is covered by subclass H04H.
3. In this subclass, at each hierarchical level, in the absence of an indication to the contrary, classification is made in the first appropriate place.

[[N0802](#)]**Guide heading:**[[N0801](#)]**H04W4/00**

[[N](#): [Mobile application](#)] **services or facilities specially adapted for wireless communication networks** [[N](#): (network arrangements or communication protocols for networked applications [H04L67/00](#); network arrangements or protocols for real-time communications [H04L65/00](#); network arrangements or network protocols for addressing or naming [H04L61/00](#); application independent communication protocol aspects and techniques in packet data networks [H04L69/00](#); network architectures or network communication protocols for network security [H04L63/00](#); wireless network security [H04W12/00](#); message switching systems [H04L12/58](#); arrangements for broadcast or conference [H04L12/18](#); telephonic communication, substation extension arrangements, cordless telephones, portable communication terminals with improved user interface to

control a main telephone operation mode or to indicate the communication status [H04M1/725F1](#); automatic or semi-automatic exchanges for telephonic communication - systems providing special services or facilities to subscribers [H04M3/42](#)) [N1205]

[N: **Notes**

1. This groups covers mobile application services or application service signalling for communication over wireless networks. 2. This group focuses on application services specially adapted for wireless networks or adjusted to the wireless environment

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- H04W4/00A
 - [N: Provisioning or reconfiguring application services e.g. OMA DM (network management [H04L12/24](#); network arrangements or communication protocols for networked applications involving the movement of software or configuration parameters, e.g. applets [H04L67/34](#); program loading or initiating [G06F9/445](#); mobile agents [G06F9/48C4P2M](#))] [N1205]
- H04W4/00E
 - [N: Mobile application execution environments for application services, e.g. communicating with application store or appstore servers in the application service network and vice versa, 3GPP SIM Application toolkit [SAT], 3GPP OSA or 3GPP MEXE (processing of user or subscriber data at user equipment or user record carrier [H04W8/18B](#))] [N1205]
- H04W4/00M
 - [N: for Machine-to-Machine communication [M2M, MTC], e.g. 3GPP M2M, OMA M2M, 3GPP MTC or Wireless Sensor Networks [WSN] (self-organizing networks [H04W84/18](#); network arrangements or communication protocols for networked applications adapted for proprietary or special purpose networking environments, e.g. medical networks, sensor networks, networks in a car, remote metering networks [H04L67/12](#); mechanical means for transferring the output of a sensing member [G01D5](#))] [N1205]
- H04W4/00M2
 - . [N: using cooperative applications for harvesting, aggregating or forwarding data, e.g. data fusion, aggregation or diffusion in WSN, master/slave node hierarchy negotiations in WSN] [N1205]
- H04W4/00N
 - [N: using short range communication, e.g. NFC, RFID or PAN (telephonic substation extension arrangements interfacing with an external accessory using a two-way short-range wireless interface [H04M1/725F1B1](#); mechanical means for transferring the output of a sensing member [G01D5](#); near-field transmission systems [H04B5/00](#))] [N1205]
- H04W4/02
 - [N: Mobile application] Services making use of the location of users or terminals [N:, e.g. OMA SUPL, OMA MLP or 3GPP LCS] (mobility data transfer [H04W8/08](#); access restriction based on user location or mobility data [H04W48/04](#); registration, e.g. affiliation to network, de-registration, e.g. terminating affiliation [H04W60/00](#); locating users or terminals for network management purpose [H04W64/00](#); navigation or navigational instruments [G01C21/00](#); radio direction-finding, radio navigation, determining distance or velocity by use of radio waves, locating or presence-detecting by use of the reflection or re-radiation of radio waves or analogous arrangements using other waves [G01S](#))] [N1205]
- H04W4/02G
 - . [N: based on location controlled areas, e.g. geofencing] [N1205]
- H04W4/02G2
 - . . [N: with dynamic range variability] [N1205]
- H04W4/02M
 - . [N: using mutual or relative location information between multiple location based services [LBS] targets or of distance thresholds] [N1205]
- H04W4/02P
 - . [N: using location based information parameters] [N1205]
- H04W4/02P2
 - . . [N: using orientation information, e.g. compass] [N1205]

- H04W4/02P4 . . . [N: using movement velocity, acceleration information] [N1205]
- H04W4/02P6 . . . [N: using historical or predicted position information, e.g. trajectory data] [N1205]
- H04W4/04 . . [N: using association of physical positions and logical data] in a dedicated environment, e.g. buildings or vehicles [N1205]
- H04W4/04B . . . [N: using ambient awareness, e.g. involving buildings using floor or room numbers] [N1205]
- H04W4/04V . . . [N: involving vehicles, e.g. floating traffic data [FTD] or vehicle traffic prediction] [N1205]

- H04W4/06 . Selective distribution or broadcast [N: application services; Mobile application] services to user groups; One-way selective calling services [N: (connection management for selective distribution or broadcast H04W76/08; resource management for broadcast services H04W72/01)] [N1205]
- H04W4/08 . . User group management (group management mechanisms in peer-to-peer network applications H04L67/10P1A; processing of subscriber group data H04W8/18G)] [N1205]
- H04W4/10 . . Push-to-Talk [N: mobile application services] or Push-on-Call [N: mobile application] services [N: (arrangements for real-time multimedia Push-to-X-Services H04L65/40P; connection management for Push-to-Talk or Push-on-Call services H04W76/08A)] [N1205]
- H04W4/12 . [N: Mobile application service signalling using] messaging, e.g. SMS [Short Message Service]; [N: Mobile application service signalling using] mailboxes; [N: Mobile application service signalling using] announcements, e.g. informing users on the status or progress of a communication request [N: (message switching systems H04L12/58; voice mail systems H04M3/533; arrangements for providing announcements H04M3/487)] [N1205]
- H04W4/14 . . [N: Mobile application service signalling using] short messaging services, e.g. SMS or USSD [Unstructured Supplementary Service Data] [N1205]
- H04W4/16 . [N: Mobile application service signalling using] communication-related supplementary services, e.g. call-transfer or call-hold [N: (automatic or semi-automatic exchange systems providing special services or facilities to subscribers H04M3/42)] [N1205]
- H04W4/18 . [N: Customizing content of application services or] 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 [N: (network arrangements or communication protocols for networked applications involving intermediate processing or storage in the network, e.g. proxy, H04L67/28; message adaptation based on network or terminal capabilities for message switching systems H04L12/58C)] [N1205]
- H04W4/18E . . [N: by embedding added-value information into content, e.g. geo-tagging (intermediate arrangements for adding application control or application functional data H04L67/28A)] [N1205]
- H04W4/20 . [N: Signalling of application services or] auxiliary data signalling, i.e. transmitting data via a non-traffic channel [N1205]
- H04W4/20C . . [N: for converged personal network application service interworking, e.g. OMA converged personal network services [CPNS]] [N1205]
- H04W4/20S . . [N: for socializing or targeting users of the same wireless application service, e.g. joint gesture signalling or mobile advertising signalling (marketing G06Q30/00A; input arrangements for transferring data to be processed into a form capable of being handled by the computer for entering handwritten data G06F3/048A3G)] [N1205]

- H04W4/22 . [N: Mobile application service] emergency connection handling [N: or mobile application services handling urgent or hazardous situations, e.g. 3GPP earthquake and tsunami warning system [ETWS] (connection management for emergency connection handling H04W76/10; centralised arrangements for answering calls for emergency applications requiring operator intervention H04M3/51E)] [N1205]
- H04W4/24 . Accounting or billing [N0801]
- H04W4/26 . . Usage measurement [N0801]
- H04W8/00 Network data management [N0801]**
- H04W8/00D . [N: Discovery of network devices, e.g. terminals] [N0801]
- H04W8/02 . 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 [N0801]
- H04W8/04 . . Registration at HLR or HSS [Home Subscriber Server] [N0801]
- H04W8/06 . . Registration at serving network Location Register, VLR or user mobility server [N0801]
- H04W8/06S . . . [N: involving selection of the user mobility server] [N0805] [C1204]
- H04W8/08 . . Mobility data transfer [N0801]
- H04W8/08B . . . [N: for traffic bypassing of mobility servers, e.g. location registers, home PLMNs or home agents] [N0801] [C1204]
- H04W8/08H . . . [N: involving hierarchical organized mobility servers, e.g. hierarchical mobile IP [HMIP]] [N0801] [C1204]
- H04W8/08M . . . [N: for preserving data network PoA address despite hand-offs] [N0809] [C1204]
- H04W8/10 . . . between location register and external networks [N0801]
- H04W8/12 . . . between location registers or mobility servers [N0801]
- H04W8/14 . . . between corresponding nodes [N0801]
- H04W8/16 . . . selectively restricting mobility [N: data] tracking [N0801] [C2010.07]
- H04W8/18 . Processing of user or subscriber data, e.g. subscribed services, user preferences or user profiles; Transfer of user or subscriber data [N0801]
- H04W8/18B . . [N: Processing at user equipment or user record carrier] [N0801] [M1204]
- H04W8/18G . . [N: Processing of subscriber group data] [N1204]
- H04W8/20 . . Transfer of user or subscriber data [N0801]
- H04W8/20B . . . [N: Transfer to or from user equipment or user record carrier] [N0801] [M1204]
- H04W8/22 . Processing or transfer of terminal data, e.g. status or physical capabilities [N0801]
- H04W8/24 . . Transfer of terminal data [N0801]
- H04W8/24N . . . [N: from a network towards a terminal] [N0801]
- H04W8/26 . Network addressing or numbering for mobility support [N0801]
- H04W8/26A . . [N: for initial activation of new user] [N0801]
- H04W8/28 . . Number portability; [N: Network address portability] [N0801] [C1204]
- H04W8/30 . Network data restoration; [N: Network data reliability; Network data fault tolerance]

N0801] [C1204]

H04W12/00 Security arrangements, e.g. access security or fraud detection; Authentication, e.g. verifying user identity or authorisation; Protecting privacy or anonymity [N0801]

H04W12/02 . Protecting privacy or anonymity [N0801]

H04W12/04 . Key management [N0801]

H04W12/06 . Authentication [N0801]

H04W12/08 . Access security [N0801]

H04W12/10 . Integrity [N0801]

H04W12/12 . Fraud detection [N0801]

H04W16/00 Network planning, e.g. coverage or traffic planning tools; Network deployment, e.g. resource partitioning or cells structures [N0801]

H04W16/02 . Resource partitioning among network components, e.g. reuse partitioning [N0801]

H04W16/04 . . Traffic adaptive resource partitioning [N0801]

H04W16/06 . . Hybrid resource partitioning, e.g. channel borrowing [N0801]

H04W16/08 . . . Load shedding arrangements [N0801]

H04W16/10 . . Dynamic resource partitioning [N0801]

H04W16/12 . . Fixed resource partitioning [N0801]

H04W16/14 . Spectrum sharing arrangements [N: between different networks] [N0801] [C1007]

H04W16/16 . . for PBS [Private Base Station] arrangements [N0801]

H04W16/18 . Network planning tools [N0801]

H04W16/20 . . for indoor coverage or short range network deployment [N0801]

H04W16/22 . Traffic simulation tools or models [N0801]

H04W16/22B . . [N: for indoor or short range network] [N0801]

H04W16/24 . Cell structures [N0801]

H04W16/26 . . Cell enhancers [N: or enhancement], e.g. for tunnels, building shadow [N0801] [C1007]

H04W16/28 . . using beam steering [N0801]

H04W16/30 . . Special cell shapes, e.g. doughnuts or ring cells [N0801]

H04W16/32 . . Hierarchical cell structures [N0801]

H04W24/00 Supervisory, monitoring or testing arrangements [N0801]

H04W24/02 . Arrangements for optimizing operational condition [N0801]

- H04W24/04 . Arrangements for maintaining operational condition [N0801]
- H04W24/06 . Testing, [N: supervising or monitoring] using simulated traffic [N0801] [M1204]
- H04W24/08 . Testing, [N: supervising or monitoring] using real traffic [N0801] [M1204]
- H04W24/10 . Scheduling measurement reports; [N: Arrangements for measurement reports] [N0801] [M1204]

- H04W28/00 Network traffic or resource management [N0801]**

- H04W28/02 . Traffic management, e.g. flow control or congestion control [N0801]
- H04W28/02B . . [N: at the air interface (dynamic wireless traffic scheduling H04W72/12)] [N1205]
- H04W28/02C . . [N: in wireless networks with changing topologies, e.g. ad-hoc networks (self-organizing networks H04W84/18)] [N1205]
- H04W28/02D . . [N: based on user or device properties, e.g. MTC-capable devices (mobile application services or facilities specially adapted for wireless communication networks for machine-to-machine communication H04W4/00M; wireless resource selection or allocation plan definition based on terminal or device properties H04W72/04J)] [N1205]
- H04W28/02D1 . . . [N: power availability or consumption] [N1205]
- H04W28/02E . . [N: based on location or mobility (handoff or reselection H04W36/00; mobile application services making use of the location of users or terminals H04W4/02)] [N1205]
- H04W28/02F . . [N: based on communication conditions (dynamic wireless traffic scheduling definition based on channel quality criteria H04W72/12B5)] [N1205]
- H04W28/02F1 . . . [N: radio quality, e.g. interference, losses or delay] [N1205]
- H04W28/02F2 . . . [N: Determining whether packet losses are due to overload or to deterioration of radio communication conditions] [N1205]
- H04W28/02G . . [N: based on conditions of the access network or the infrastructure network (central resource management H04W28/16)] [N1205]
- H04W28/02H . . [N: per individual bearer or channel (dynamic wireless traffic scheduling H04W72/12)] [N1205]
- H04W28/02H1 . . . [N: the individual bearer or channel having a maximum bit rate or a bit rate guarantee] [N1205]
- H04W28/02H2 . . . [N: involving mapping traffic to individual bearers or channels, e.g. traffic flow template [TFT]] [N1205]
- H04W28/02J . . [N: using specific QoS parameters for wireless networks, e.g. QoS class identifier [QCI] or guaranteed bit rate [GBR] (negotiating SLA or negotiating QoS H04W28/24)] [N1205]
- H04W28/02K . . [N: 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 H04W80/00)] [N1205]
- H04W28/02L . . [N: using buffer status reports (dynamic wireless traffic scheduling definition H04W72/12B)] [N1205]
- H04W28/02M . . [N: detecting congestion or overload during communication (monitoring arrangements H04L12/26M)] [N1205]
- H04W28/02N . . [N: Congestion control (performing reselection for handling the traffic H04W36/22;

- load shedding arrangements in network planning H04W16/08; dynamic wireless traffic scheduling H04W72/12) [N1205]
- H04W28/02P . . [N: forcing collision (non-scheduled or contention based wireless access channel H04W74/08)] [N1205]
- H04W28/04 . . Error control [N:, e.g. treating errors, collisions, noise or interference (arrangements for detecting or preventing errors in the information received H04L1/00)] [N1205]
- H04W28/04C . . . [N: Treating collisions] [N1205]
- H04W28/04C2 [N: Collision avoidance] [N1205]
- H04W28/04C4 [N: Collision detection] [N1205]
- H04W28/04N . . . [N: Treating noise or interference (means associated with receiver for limiting or suppressing noise or interference induced by transmission H04B1/10; baseband systems or shaping networks in transmitter or receiver H04L25/03)] [N1205]
- H04W28/06 . . Optimizing , e.g. header compression, information sizing [N0801]
- H04W28/06D . . . [N: using assembly or disassembly of packets] [N1007]
- H04W28/08 . . Load balancing or load distribution [N0801]
- H04W28/08A . . . [N: among bearers or channels] [N1205]
- H04W28/10 . . Flow control [N: between communication endpoints] [N1205]
- H04W28/12 . . . using signaling between network elements [N0801]
- H04W28/14 . . . using intermediate storage [N0801]
- H04W28/16 . Central resource management; Negotiation of resources [N: or communication parameters], e.g. negotiating bandwidth or QoS [Quality of Service] [N0801] [C1204]
- H04W28/18 . . Negotiating wireless communication parameters [N0801]
- H04W28/20 . . . Negotiating bandwidth [N0801]
- H04W28/22 . . . Negotiating communication rate [N0801]
- H04W28/24 . . . Negotiating SLA [Service Level Agreement]; Negotiating QoS [Quality of Service] [N1205]
- H04W28/26 . . Resource reservation [N0801]
- H04W36/00** **Hand-off or reselection arrangements [N0801]**
- [N: **Note** [C1204]
In this group, local priority rules supersede the first-place priority rule (FPPR) applying throughout H04W
]
- H04W36/00P . . [N: Control or signalling for completing the hand-off] [N1007]
- H04W36/00P2 . . . [N: for data session or connection] [N1007]
- H04W36/00P2C [N: for hand-off preparation] [N1007]
- H04W36/00P2E [N: for transferring sessions between adjacent core network technologies] [N1007]
- H04W36/00P2M [N: for a plurality of sessions or connections, e.g. multi-call, multi-bearer connections] [N1007]
- H04W36/00P2T [N: with transfer of context information] [N1007]
- H04W36/00P2T2 [N: of security context information] [N1007]
- H04W36/00P2T4 [N: of quality context information] [N1007]

- H04W36/00P4 . . [N: involving radio access media independent information, e.g. MIH [Media independent Hand-off]] [N1007]
- H04W36/00P6 . . [N: Transmission and use of information for re-establishing the radio link] [N1007]
- H04W36/00P6C . . . [N: of neighbor cell information] [N1007] [C1204]
- H04W36/00P6N . . . [N: of control information between different types of networks in order to establish a new radio link in the target network] [N1007] [C1008]
- H04W36/00P6R . . . [N: of resource information of target access point] [N1007]
- H04W36/00P6T . . . [N: of access information of target access point] [N1007]
- H04W36/00P8 . . [N: Determination of parameters used for hand-off, e.g. generation or modification of neighbour cell lists] [N1007]
- H04W36/00P8C . . . [N: Scheduling hand-off measurements] [N1007]
- H04W36/00P8E . . . [N: Definition of hand-off measurement parameters] [N1007]

- H04W36/02 . Buffering or recovering information during reselection; [N: Modification of the traffic flow during hand-off] [N0801] [C1204]
- H04W36/02B . . [N: Buffering or recovering information during reselection] [N1204]
- H04W36/02M . . [N: Multicasting of data during hand-off] [N1204]

- H04W36/04 . Reselecting a cell layer in multi-layered cells [N0801]

- H04W36/06 . Reselecting a communication resource in the serving access point [N0801]

- H04W36/08 . Reselecting an access point [N0801]

- H04W36/10 . Reselecting an access point controller [N0801]

- H04W36/12 . Reselecting a serving backbone network switching or routing node [N0801]

- H04W36/14 . Reselecting a network or an air interface [N0801]

- H04W36/16 . Performing reselection for specific purposes [N0801]
- H04W36/16P . . [N: for improving the overall network performance ([H04W36/18](#) to [H04W36/22](#) take precedence)] [N1007]
- H04W36/18 . . for allowing seamless reselection, e.g. soft reselection [N0801]
- H04W36/20 . . for optimizing the interference level [N0801]
- H04W36/22 . . for handling the traffic [N0801]

- H04W36/24 . Reselection being triggered by specific parameters [N: used to improve the performance of a single terminal] [N0801] [C1007]
- H04W36/24H . . [N: by historical data] [N1007]
- H04W36/26 . . by agreed or negotiated communication parameters [N0801]
- H04W36/28 . . . involving a plurality of connections, e.g. multi-call, multi-bearer connections [N0801]
- H04W36/30 . . by measured or perceived connection quality data [N0801]
- H04W36/32 . . by location or mobility data, e.g. speed data [N0801]

- H04W36/34 . Reselection control [N0801]
- H04W36/36 . . by user or terminal equipment [N0801]

- H04W36/36M . . . [N: by manual user interaction] [N1007]
- H04W36/38 . . . by fixed network equipment [N0801]
- H04W36/38N . . . [N: of the core network] [N1007]

- H04W40/00** **Communication routing or communication path finding [N0801]**

- H04W40/00S . . [N: Routing actions in the presence of nodes in sleep or doze mode] [N1007]

- H04W40/02 . . Communication route or path selection, e.g. power-based or shortest path routing [N0801]
- H04W40/02F . . . [N: Limited or focused flooding to selected areas of a network] [N1007]
- H04W40/02S . . . [N: Route selection considering the moving speed of individual devices] [N1007]
- H04W40/04 . . . based on wireless node resources [N0801]
- H04W40/06 based on characteristics of available antennas [N0801]
- H04W40/08 based on transmission power [N0801]
- H04W40/10 based on available power or energy [N0801]
- H04W40/12 . . . based on transmission quality or channel quality [N0801]
- H04W40/12R [N: using a measured number of retransmissions as a link metric] [N1007]
- H04W40/14 based on stability [N0801]
- H04W40/16 based on interference [N0801]
- H04W40/18 . . . based on predicted events [N0801]
- H04W40/20 . . . based on geographic position or location [N0801]
- H04W40/20T [N: using topographical information, e.g. hills, high rise buildings] [N1007]
- H04W40/22 . . . using selective relaying for reaching a BTS [Base Transceiver Station] or an access point [N0801]

- H04W40/24 . . Connectivity information management, e.g. connectivity discovery or connectivity update [N0801]
- H04W40/24A . . . [N: aging of topology database entries] [N1007]
- H04W40/24B . . . [N: using a network of reference devices, e.g. beaconing] [N1008]
- H04W40/24D . . . [N: Connectivity information discovery] [N0801]
- H04W40/24U . . . [N: Connectivity information update] [N0801]
- H04W40/26 . . . for hybrid routing by combining proactive and reactive routing [N0801]
- H04W40/28 . . . for reactive routing [N0801]
- H04W40/30 . . . for proactive routing [N0801]
- H04W40/32 . . . for defining a routing cluster membership [N0801]

- H04W40/34 . . Modification of an existing route [N0801]
- H04W40/36 . . . due to handover [N0801]
- H04W40/38 . . . adapting due to varying relative distances between nodes [N0801]

H04W48/00 **Access restriction; Network selection; Access point selection [N0801]**

[N: **WARNING**]

[N1204]Group [H04W48/17](#) does not correspond to former or future IPC groups.
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- H04W48/02 . Access restriction performed under specific conditions [N0801]
- H04W48/04 . . based on user or terminal location or mobility data, e.g. moving direction, speed [N0801]
- H04W48/06 . . based on traffic conditions [N0801]
- H04W48/08 . Access restriction or access information delivery, e.g. discovery data delivery [N0801]
- H04W48/10 . . using broadcasted information [N0801]
- H04W48/12 . . using downlink control channel [N0801]
- H04W48/14 . . using user query [N: or user detection] [N0801] [C1007]
- H04W48/16 . Discovering, processing access restriction or access information [N0801]
- H04W48/17 . [N: Selecting a data network PoA [Point of Attachment]] [N1204]
- H04W48/18 . Selecting a network or a communication service [N0801]
- H04W48/20 . Selecting an access point [N0801]

- H04W52/00** **Power Management, e.g. TPC [Transmission Power Control], power saving or power classes [N: (gain control in transmitters or power amplifiers [H03G3/30D2](#))] [N0801] [C1203]**

- H04W52/02 . Power saving arrangements [N: (in wired systems [H04L12/12](#); signaling of mobile application services, e.g. low battery notifications [H04W4/20](#))] [N0801] [C1205]
- H04W52/02N . . [N: in the radio access network or backbone network of wireless communication networks] [N1204]
- H04W52/02N2 . . . [N: in access points, e.g. base stations (access point devices per se [H04W88/08](#))] [N1204]
- H04W52/02T . . [N: in terminal devices (terminal devices per se [H04W88/02](#))] [N1204]
- H04W52/02T2 . . . [N: managed by the network, e.g. network or access point is master and terminal is slave] [N1204]
- H04W52/02T2A [N: using a pre-established activity schedule, e.g. traffic indication frame] [N1204]
- H04W52/02T2C [N: where the power saving management affects multiple terminals] [N1204]
- H04W52/02T2E [N: in packet switched networks] [N1204]
- H04W52/02T4 . . . [N: using monitoring of external events, e.g. the presence of a signal] [N1204]
- H04W52/02T4A [N: where the received signal is a wanted signal] [N1204]
- H04W52/02T4A2 [N: according to average transmission signal activity] [N1204]
- H04W52/02T4C [N: where the received signal is a power saving command] [N1204]
- H04W52/02T4E [N: where the received signal is an unwanted signal, e.g. interference or idle signal] [N1204]
- H04W52/02T4G [N: where no transmission is received, e.g. out of range of the transmitter] [N1204]

H04W52/02T4J	. . . .	[N: according to signal strength] [N1204]
H04W52/02T4L	. . . .	[N: dependent on the time of the day, e.g. according to expected transmission activity] [N1204]
H04W52/02T6	. . . .	[N: using monitoring of local events, e.g. events related to user activity] [N1204]
H04W52/02T6A	. . . .	[N: detecting a user operation or a tactile contact or a motion of the device] [N1204]
H04W52/02T6C	. . . .	[N: controlling an operation mode according to history or models of usage information, e.g. activity schedule or time of day] [N1204]
H04W52/02T8	. . . .	[N: managing power supply demand, e.g. depending on battery level] [N1204]
H04W52/02T8A	. . . .	[N: by selectively disabling software applications] [N1204]
H04W52/02T8C	. . . .	[N: by controlling user interface components] [N1204]
H04W52/02T8C2	. . . . .	[N: by controlling a display operation or backlight unit] [N1205]
H04W52/02T8E	. . . .	[N: by switching on or off the equipment or parts thereof] [N1204]
H04W52/02T8E2	. . . . .	[N: according to available power supply, e.g. switching off when a low battery condition is detected] [N1204]
H04W52/02T8E4	. . . . .	[N: switching on or off only a part of the equipment circuit blocks] [N1204]
H04W52/02T8E4A	. . . . .	[N: with sequential power up or power down of successive circuit blocks, e.g. switching on the local oscillator before RF or mixer stages] [N1204]
H04W52/02T8G	. . . .	[N: changing the clock frequency of a controller in the equipment] [N1204]
H04W52/02T8G2	. . . . .	[N: reducing the clock frequency of the controller] [N1204]
H04W52/02T8G4	. . . . .	[N: having a sub-controller with a low clock frequency switching on and off a main controller with a high clock frequency] [N1204]
H04W52/02T8J	. . . .	[N: switching to a backup power supply] [N1204]
H04W52/04	. . . .	TPC [Transmission power control] [N0801]
H04W52/06	. . . .	TPC algorithms [N0801]
H04W52/08	. . . .	Closed loop power control [N0801]
H04W52/10	. . . .	Open loop power control [N0801]
H04W52/12	. . . .	Outer and inner loops [N0801]
H04W52/12C	. . . . .	[N: cascaded outer loop power control] [N1112]
H04W52/14	. . . .	Separate analysis of uplink or downlink [N0801]
H04W52/14D	. . . . .	[N: Downlink power control] [N0806]
H04W52/14U	. . . . .	[N: Uplink power control] [N0806]
H04W52/16	. . . .	Deriving transmission power values from another channel [N0801]
H04W52/18	. . . .	TPC being performed according to specific parameters [N0801]
H04W52/20	. . . .	using error rate [N0801]
H04W52/22	. . . .	taking into account previous information or commands [N0801]
H04W52/22C	. . . . .	[N: using past power control commands] [N0806]
H04W52/22F	. . . . .	[N: predicting future states of the transmission] [N0806]
H04W52/22S	. . . . .	[N: Calculation of statistics, e.g. average, variance] [N0806]
H04W52/22T	. . . . .	[N: using past references to control power, e.g. look-up-table] [N0806]
H04W52/22V	. . . . .	[N: using past power values or information] [N0806]
H04W52/24	. . . .	using SIR [Signal to Interference Ratio] or other wireless path parameters [N0801]

H04W52/24G	. . . .	[N: taking into account channel quality metrics, e.g. SIR, SNR, CIR, Eb/lo] [N0806]
H04W52/24H	. . . .	[N: taking into account path loss] [N0806]
H04W52/24J	. . . .	[N: taking into account interferences] [N0806]
H04W52/24J1	. . . . .	[N: Interferences in heterogeneous networks, e.g. among macro and femto or pico cells or other sector / system interference (OSI)] [N1112]
H04W52/24R	. . . .	[N: taking into account received signal strength] [N0806]
H04W52/24X	. . . .	[N: where the output power of a terminal is based on a path parameter calculated in said terminal] [N0806]
H04W52/24Y	. . . .	[N: where the output power of a terminal is based on a path parameter sent by another terminal] [N0806]
H04W52/24Z	. . . .	[N: where transmission power control commands are generated based on a path parameter] [N0806]
H04W52/26	. . .	using transmission rate or quality of service QoS [Quality of Service] [N0801]
H04W52/26M	. . . .	[N: taking into account adaptive modulation and coding (AMC) scheme (AMC per se H04L1/00A)] [N0806]
H04W52/26Q	. . . .	[N: taking into account the quality of service QoS] [N0806]
H04W52/26R	. . . .	[N: taking into account the information rate] [N0806]
H04W52/28	. . .	using user profile, e.g. mobile speed, priority or network state, e.g. standby, idle or non transmission [N0801]
H04W52/28D	. . . .	[N: taking into account user or data type priority] [N0806]
H04W52/28E	. . . .	[N: taking into account the speed of the mobile] [N0806]
H04W52/28L	. . . .	[N: Power depending on the position of the mobile] [N0806]
H04W52/28M	. . . .	[N: taking into account the mobility of the user] [N1112]
H04W52/28P	. . . .	[N: during data packet transmission, e.g. high speed packet access (HSPA)] [N0806] [C1112]
H04W52/28S	. . . .	[N: when the channel is in stand-by] [N0806]
H04W52/28U	. . . .	[N: taking into account the usage mode, e.g. hands-free, data transmission, telephone] [N0806]
H04W52/30	. .	using constraints in the total amount of available transmission power [N0801]
H04W52/32	. . .	TPC of broadcast or control channels [N0801]
H04W52/32B	. . . .	[N: Power control of broadcast channels] [N0806]
H04W52/32C	. . . .	[N: Power control of control or pilot channels] [N0806]
H04W52/32M	. . . .	[N: Power control of multicast channels] [N0806]
H04W52/34	. . .	TPC management, i.e. sharing limited amount of power among users or channels or data types, e.g. cell loading [N0801]
H04W52/34L	. . . .	[N: taking into account loading or congestion level] [N0806]
H04W52/34N	. . . .	[N: distributing total power among users or channels] [N0806] [C1112]
H04W52/36	. . .	with a discrete range or set of values, e.g. step size, ramping or offsets [N0801]
H04W52/36A	. . . .	[N: Aspects of the step size] [N0806]
H04W52/36H	. . . .	[N: Power headroom reporting] [N1112]
H04W52/36K	. . . .	[N: Power values between minimum and maximum limits, e.g. dynamic range] [N0806]
H04W52/38	. .	TPC being performed in particular situations [N0801]
H04W52/38P	. . .	[N: power control in peer-to-peer links] [N1204]

- H04W52/38R . . . [N: centralized, e.g. when the radio network controller or equivalent takes part in the power control] [N1112]
- H04W52/40 . . . during macro-diversity or soft handoff [N0801]
- H04W52/42 . . . in systems with time, space, frequency or polarisation diversity [N0801]
- H04W52/44 . . . in connection with interruption of transmission [N0801]
- H04W52/46 . . . in multi hop networks, e.g. wireless relay networks [N0801]
- H04W52/48 . . . during retransmission after error or non-acknowledgment [N0801]
- H04W52/50 . . . at the moment of starting communication in a multiple access environment [N0801]
- H04W52/52 . . . using AGC [Automatic Gain Control] circuits or amplifiers [N0801]
- H04W52/54 . . . Signalisation aspects of the TPC commands, e.g. frame structure [N0801]
- H04W52/54M . . . [N: modifying TPC bits in special situations] [N1204]
- H04W52/56 . . . detection of errors of TPC bits [N0801]
- H04W52/58 . . . format of the TPC bits [N0801]
- H04W52/60 . . . using different transmission rates for TPC commands [N0801]

H04W56/00 Synchronization arrangements [N0801]

- H04W56/00B . [N: synchronizing of arrival of multiple uplinks] [N1007]
- H04W56/00D . [N: Synchronization between nodes] [N1007]
- H04W56/00D2 . . [N: one node acting as a reference for the others] [N1007]
- H04W56/00D4 . . [N: Mutual synchronization] [N1007]
- H04W56/00D6 . . [N: synchronizing potentially movable access points] [N1007]
- H04W56/00F . [N: Arrangements to increase tolerance to errors in transmission or reception timing] [N1007]
- H04W56/00H . [N: detecting errors in frequency or phase] [N1007]
- H04W56/00K . [N: compensating for timing error of reception due to propagation delay] [N1007]
- H04W56/00K2 . . [N: compensating for timing error by altering transmission time] [N1007]
- H04W56/00K4 . . [N: compensating for timing error by adjustment in the receiver] [N1007]
- H04W56/00M . [N: determining timing error of reception due to propagation delay] [N1007]
- H04W56/00M2 . . [N: using known positions of transmitter and receiver] [N1007]
- H04W56/00M4 . . [N: using measurement of signal travel time] [N1007]
- H04W56/00M4B . . . [N: Open loop measurement] [N1007]
- H04W56/00M4B2 [N: based on arrival time vs. expected arrival time] [N1007]
- H04W56/00M4B2B [N: detecting arrival of signal based on received raw signal] [N1007]
- H04W56/00M4B2D [N: detecting a given structure in the signal] [N1007]
- H04W56/00M4D . . . [N: Closed loop measurements] [N1007]
- H04W56/00M6 . . [N: estimated based on signal strength] [N1007]

H04W60/00 Registration, e.g. affiliation to network; De-registration, e.g. terminating affiliation [N0801]

- H04W60/00M . [N: Multiple registrations, e.g. multihoming] [N0901]
- H04W60/02 . by periodical registration [N0801]
- H04W60/04 . using triggered events [N0801]
- H04W60/06 . De-registration or Detaching [N0801]

- H04W64/00** **Locating users or terminals [N: or network equipment] for network management purposes, e.g. mobility management [N0801] [C1007]**
- H04W64/00B . [N: locating network equipment] [N1007]
- H04W64/00M . [N: with additional information processing, e.g. for direction or speed determination] [N0801]

- H04W68/00** **Notification of users, e.g. alerting for incoming communication or change of service [N0801]**
- H04W68/00B . [N: Transmission of information for alerting of incoming communication] [N1204]
- H04W68/02 . Arrangements for increasing efficiency of notification or paging channel [N0801]
- H04W68/02Q . . [N: Indirect paging] [N0801]
- H04W68/04 . multi-step notification using statistical or historical mobility data [N0801]
- H04W68/06 . using multi-step notification by changing the notification area [N0801]
- H04W68/08 . using multi-step notification by increasing the notification area [N0801]
- H04W68/10 . using simulcast notification [N0801]
- H04W68/12 . Inter-network notification [N0801]

- H04W72/00** **Local resource management, e.g. wireless traffic scheduling or selection or allocation of wireless resources [N0801]**
- [N: **Note** [C1204]
In this group, local priority rules supersede the first-place priority rule (FPPR) applying throughout H04W
]
- H04W72/00B . [N: Resource management for broadcast services] [N1204]
- H04W72/02 . Selection of wireless resources by user or terminal [N0801] [C1204]
- H04W72/04 . Wireless resource allocation [N0801] [C1204]
- H04W72/04F . . [N: involving control information exchange between nodes] [N1007] [C1204]
- H04W72/04F2 . . . [N: in uplink direction of a wireless link, i.e. towards network] [N1007] [C1204]

H04W72/04F4	. . .	[N: in downlink direction of a wireless link, i.e. towards terminal] [N1007] [C1204]
H04W72/04F6	. . .	[N: between access points] [N1007]
H04W72/04F8	. . .	[N: between access point and access point controlling device] [N1007]
H04W72/04H	. .	[N: where an allocation plan is defined based on the type of the allocated resource] [N1204]
H04W72/04H2	. . .	[N: the resource being a slot, sub-slot or frame] [N1204]
H04W72/04H4	. . .	[N: the resource being a frequency, carrier or frequency band] [N1204]
H04W72/04H6	. . .	[N: the resource being in the space domain, e.g. beams] [N1204]
H04W72/04H8	. . .	[N: the resource being a scrambling code] [N1204]
H04W72/04H10	. . .	[N: the resource being transmission power] [N1204]
H04W72/04J	. .	[N: where an allocation plan is defined based on terminal or device properties] [N1204]
H04W72/04L	. .	[N: where an allocation plan is defined based on load] [N1204]
H04W72/04N	. .	[N: where an allocation plan is defined based on a resource usage policy] [N1204]
H04W72/06	. .	[N: where an allocation plan is defined] based on a ranking criteria of the wireless resources [N0801] [C1204]
H04W72/08	. .	[N: where an allocation plan is defined] based on quality criteria [N0801] [C1204]
H04W72/08B	. . .	[N: using the level of interference] [N1007]
H04W72/08D	. . .	[N: using measured or perceived quality] [N1007]
H04W72/08F	. . .	[N: using requested quality] [N1007]
H04W72/10	. .	[N: where an allocation plan is defined] based on priority criteria [N0801] [C1204]
H04W72/12	. .	[N: Dynamic] Wireless traffic scheduling; [N: Dynamically scheduled allocation on shared channel] [N0801] [C1007]
H04W72/12B	. .	[N: Schedule definition, set-up or creation] [N1007]
H04W72/12B2	. . .	[N: for groups of terminals or users] [N1007]
H04W72/12B3	. . .	[N: for collaboration of different radio technologies] [N1007]
H04W72/12B4	. . .	[N: based on age of data to be sent] [N1007]
H04W72/12B5	. . .	[N: based on channel quality criteria, e.g. channel state dependent scheduling] [N1007]
H04W72/12B5B	. . . .	[N: using measured or perceived quality] [N1007]
H04W72/12B5D	. . . .	[N: using requested quality] [N1007]
H04W72/12B6	. . .	[N: based on precedence or priority of the traffic information] [N1007]
H04W72/12B8	. . .	[N: based on priority of the information source or recipient] [N1007]
H04W72/12B10	. . .	[N: based on load] [N1007]
H04W72/12B12	. . .	[N: based on resource usage policy] [N1007]
H04W72/12D	. .	[N: Schedule usage, i.e. actual mapping of traffic onto schedule; Multiplexing of flows into one or several streams; Mapping aspects; Scheduled allocation] [N1007]
H04W72/12D2	. . .	[N: of uplink data flows] [N1007]
H04W72/12D4	. . .	[N: of downlink data flows] [N1007]
H04W72/12F	. .	[N: Transmission of control information for scheduling] [N1007]
H04W72/12F2	. . .	[N: in the uplink, i.e. from terminal to network] [N1007]
H04W72/12F4	. . .	[N: in the downlink, i.e. towards the terminal] [N1007]
H04W72/12F4B	. . . .	[N: using a grant or specific channel (H04W72/14 takes precedence)]

N1007]

- H04W72/14 . . using a grant [N: or specific] channel [N0801] [C1204]

H04W74/00 **Wireless channel access, e.g. scheduled or random access [N0801]**

- H04W74/00C . [N: Transmission of channel access control information] [N1007]
- H04W74/00C2 . . [N: in the uplink, i.e. towards network] [N1007] [C1204]
- H04W74/00C4 . . [N: in the downlink, i.e. towards the terminal] [N1007]
- H04W74/00C6 . . [N: with additional processing of random access related information at receiving side] [N1204]
- H04W74/02 . Hybrid access techniques [N0801]
- H04W74/04 . Scheduled [N: or contention-free] access [N0801] [C1007]
- H04W74/06 . . using polling [N0801]
- H04W74/08 . Non-scheduled [N: or contention based] access, e.g. random access, ALOHA, CSMA [Carrier Sense Multiple Access] [N0801] [C1007]
- H04W74/08B . . [N: using carrier sensing, e.g. as in CSMA] [N1007]
- H04W74/08B2 . . . [N: carrier sensing with collision avoidance] [N1007]
- H04W74/08B4 . . . [N: carrier sensing with collision detection] [N1007]
- H04W74/08D . . [N: using a random access procedure] [N1007]
- H04W74/08D2 . . . [N: with collision treatment] [N1007]
- H04W74/08D2B [N: collision avoidance] [N1007]
- H04W74/08D2D [N: collision detection] [N1007]
- H04W74/08F . . [N: using a dedicated channel for access] [N1007]
- H04W74/08F2 . . . [N: with assigned priorities based access] [N1007]
- H04W74/08F4 . . . [N: for un-synchronized access] [N1007]
- H04W74/08F6 . . . [N: for synchronized access] [N1007]

H04W76/00 **Connection management, e.g. connection set-up, manipulation or release [N0801]**

- H04W76/00B . [N: for selective distribution or broadcast] [N1204]
- H04W76/00B2 . . [N: for Push-to-Talk or Push-on-Call services] [N1204]
- H04W76/00E . [N: for emergency connection handling] [N1204]
- H04W76/02 . Connection set-up [N0801]
- H04W76/02A . . [N: Allocation or use of connection identifiers] [N1007]
- H04W76/02C . . [N: Set-up of transport tunnels] [N1007]
- H04W76/02D . . [N: Direct mode set-up] [N1007]
- H04W76/02M . . [N: Set-up of multiple wireless link connections] [N1007]
- H04W76/02M2 . . . [N: involving adjacent core network technologies] [N1008]
- H04W76/02P . . [N: Management of set-up rejection or failure] [N1007]
- H04W76/02R . . [N: Connection re-establishment] [N1007]

- H04W76/04 . Connection manipulation [N0801]
- H04W76/04C . . [N: Manipulation of transport tunnels] [N1007]
- H04W76/04D . . [N: Direct mode connection manipulation] [N1007]
- H04W76/04M . . [N: Maintenance of an established connection] [N1007]
- H04W76/04R . . [N: Transitions among RRC [Radio Resource Control] states] [N1007]
- H04W76/04T . . [N: Discontinuous transmission or reception [DTX, DRX]] [N1007]

- H04W76/06 . Connection release [N0801]
- H04W76/06C . . [N: Release of transport tunnels] [N1007]
- H04W76/06P . . [N: Selective release of ongoing connections] [N1007]
- H04W76/06P2 . . . [N: for the purpose of reassigning the resources associated with the released connections] [N1007]
- H04W76/06T . . [N: Connection release triggered by timers] [N1007]

- H04W80/00** **Wireless network protocols or protocol adaptations to wireless operation, e.g. WAP [Wireless Application Protocol] [N0801]**

- H04W80/02 . Data link layer protocols
 - [N: **WARNING**
This group is used only for indicating additional information when it is of interest for search
]

- H04W80/04 . Network layer protocols, e.g. mobile IP [Internet Protocol]
 - [N: **WARNING**
This group is used only for indicating additional information when it is of interest for search
]

- H04W80/04V . . involving different protocol versions, e.g. MIPv4 and MIPv6
 - [N: **WARNING**
This group is used only for indicating additional information when it is of interest for search
]

- H04W80/06 . Transport layer protocols, e.g. TCP [Transport Control Protocol] over wireless ([N: (transmission control protocol/Internet protocol [TCP/IP] or user datagram protocol [UDP] [H04L69/16](#))] [N1205]

- H04W80/08 . Upper layer protocols [N: (network arrangements or communication protocols for networked applications H04L67/00)] [N1205]
- H04W80/08V . . involving different upper layer protocol versions, e.g. LCS - SUPL or WSN-SOA-WSDP [N1205]
- H04W80/10 . . adapted for [N: application] session management, e.g. SIP [Session Initiation Protocol] [N: (connection management H04W76/00; arrangements for session management H04L67/14)] [N1205]
- H04W80/12 . . Application layer protocols, e.g. WAP [N0801]

- H04W84/00** **Network topologies [N0801]**

[N: **Note** [C1204]

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

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- H04W84/00M . [N: Moving wireless networks] [N0801]
- H04W84/02 . Hierarchical pre-organized networks, e.g. paging networks, cellular networks, WLAN [Wireless Local Area Network] or WLL [Wireless Local Loop] [N0801]
- H04W84/02S . . [N: One-way selective calling networks, e.g. wide area paging] [N0801]
- H04W84/02S2 . . . [N: with acknowledge back capability] [N0801]
- H04W84/02S4 . . . [N: providing paging services] [N1204]
- H04W84/04 . . Large scale networks; Deep hierarchical networks [N0801]
- H04W84/04C . . . [N: Public Land Mobile systems, e.g. cellular systems] [N0801]
- H04W84/04C2 [N: using private Base Stations, e.g. femto Base Stations, home Node B] [N1007]
- H04W84/04C4 [N: using dedicated repeater stations] [N1007]
- H04W84/06 . . . Airborne or Satellite Networks [N0801]
- H04W84/08 . . . Trunked mobile radio systems [N0801]
- H04W84/10 . . Small scale networks; Flat hierarchical networks [N0801]
- H04W84/10P . . . [N: PBS [Private Base Station] network ([H04W84/12](#) to [H04W84/16](#) take precedence)] [N1007]
- H04W84/12 . . . WLAN [Wireless Local Area Networks] [N0801]
- H04W84/14 . . . WLL [Wireless Local Loop]; RLL [Radio Local Loop] [N0801]
- H04W84/16 . . . WPBX [Wireless Private Branch Exchange] [N0801]
- H04W84/18 . Self-organizing networks, e.g. ad-hoc networks or sensor networks [N0801]
- H04W84/20 . . Master-slave [N: selection or change] arrangements [N0801] [C1204]
- H04W84/22 . . with access to wired networks [N0801]
- H04W88/00** **Devices specially adapted for wireless communication networks, e.g. terminals, base stations or access point devices [N0801]**
- H04W88/00D . [N: Data network PoA devices] [N0809]
- H04W88/02 . Terminal devices [N0801]
- H04W88/02B . . [N: adapted for Wireless Local Loop operation] [N0801]
- H04W88/02S . . [N: Selective call receivers] [N0801]
- H04W88/02S2 . . . [N: with message or information receiving capability] [N0801]
- H04W88/02S4 . . . [N: Selective call decoders] [N0801]
- H04W88/02S4D [N: using digital address codes] [N0801]
- H04W88/02S4F [N: using frequency address codes] [N0801]
- H04W88/02S4P [N: using pulse address codes] [N0801]
- H04W88/04 . . adapted for relaying to or from another terminal or user [N0801]

- H04W88/06 . . . adapted for operation in multiple networks [N: or having at least two operational modes], e.g. multi-mode terminals [N0801] [C1204]
- H04W88/08 . . . Access point devices [N0801]
- H04W88/08R . . . [N: Access point devices with remote components] [N0809] [C1204]
- H04W88/10 . . . adapted for operation in multiple networks, e.g. multi-mode access points [N0801]
- H04W88/12 . . . Access point controller devices [N0801]
- H04W88/14 . . . Backbone network devices [N0801]
- H04W88/16 . . . Gateway arrangements [N0801]
- H04W88/18 . . . Service Support; Network management devices [N0801]
- H04W88/18C . . . [N: Transcoding devices; Rate adaptation devices] [N0801] [C1204]
- H04W88/18F . . . [N: Network node acting on behalf of an other network entity, e.g. proxy] [N0801]
- H04W88/18M . . . [N: Messaging devices, e.g. message centre] [N0801]
- H04W88/18S . . . [N: Selective call encoders for paging networks, e.g. paging centre devices] [N0801]
- H04W88/18S2 [N: using digital or pulse address codes] [N0801]
- H04W88/18S4 [N: using frequency address codes] [N0801]

H04W92/00 Interfaces specially adapted for wireless communication networks [N0801]

- H04W92/02 . . . Inter-networking arrangements [N0801]
- H04W92/04 . . . Interfaces between hierarchically different network devices [N0801]
- H04W92/04S [N: between access point and backbone network device] [N0809]
- H04W92/06 between gateways and public network devices [N0801]
- H04W92/08 between user and terminal device [N0801]
- H04W92/10 between terminal device and access point, i.e. wireless air interface [N0801]
- H04W92/12 between access points and access point controllers [N0801]
- H04W92/14 between access point controllers and backbone network device [N0801]
- H04W92/16 . . . Interfaces between hierarchically similar devices [N0801]
- H04W92/18 between terminal devices [N0801]
- H04W92/20 between access points [N0801]
- H04W92/22 between access point controllers [N0801]
- H04W92/24 between backbone network devices [N0801]

H04W99/00 Subject matter not provided for in other groups of this subclass [N0509]