

CPC**COOPERATIVE PATENT CLASSIFICATION****H04W**

WIRELESS COMMUNICATIONS NETWORKS (radio transmission systems [H04B 7/00](#); transmission systems using electromagnetic waves other than radio waves, e.g. light, infrared [H04B 10/00](#); communication systems using wireless extensions, i.e. wireless links without selective communication, e.g. cordless telephones [H04M 1/72](#); broadcast communication [H04H](#))

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](#).
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.

H04W 4/00

{Mobile application} services or facilities specially adapted for wireless communication networks {(network arrangements or communication protocols for networked applications [H04L 67/00](#); network arrangements or protocols for real-time communications [H04L 65/00](#); network arrangements or network protocols for addressing or naming [H04L 61/00](#); application independent communication protocol aspects and techniques in packet data networks [H04L 69/00](#); network architectures or network communication protocols for network security [H04L 63/00](#); wireless network security [H04W 12/00](#); message switching systems [H04L 12/58](#); arrangements for broadcast or conference [H04L 12/18](#); 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 [H04M 1/72522](#); automatic or semi-automatic exchanges for telephonic communication - systems providing special services or facilities to subscribers [H04M 3/42](#)}

NOTES

1. This groups covers mobile application services or application service signalling for communication over wireless networks.

H04W 4/00
(continued)

2. This group focuses on application services specially adapted for wireless networks or adjusted to the wireless environment

- H04W 4/001
 - {Provisioning or reconfiguring application services e.g. OMA DM (network management [H04L 12/24](#); network arrangements or communication protocols for networked applications involving the movement of software or configuration parameters, e.g. applets [H04L 67/34](#); program loading or initiating [G06F 9/445](#); mobile agents [G06F 9/4862](#)}
- H04W 4/003
 - {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 [H04W 8/183](#))}
- H04W 4/005
 - {for Machine-to-Machine communication [M2M, MTC], e.g. 3GPP M2M, OMA M2M, 3GPP MTC or Wireless Sensor Networks [WSN] (self-organizing networks [H04W 84/18](#); 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 [H04L 67/12](#); mechanical means for transferring the output of a sensing member [G01D 5/00](#))}
- H04W 4/006
 - • {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}
- H04W 4/008
 - {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 [H04M 1/7253](#); mechanical means for transferring the output of a sensing member [G01D 5/00](#); near-field transmission systems [H04B 5/00](#))}
- H04W 4/02
 - {Mobile application} Services making use of the location of users or terminals {, e.g. OMA SUPL, OMA MLP or 3GPP LCS} (mobility data transfer [H04W 8/08](#); access restriction based on user location or mobility data [H04W 48/04](#); registration, e.g. affiliation to network, de-registration, e.g. terminating affiliation [H04W 60/00](#); locating users or terminals for network management purpose [H04W 64/00](#); navigation or navigational instruments [G01C 21/00](#); 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](#))
- H04W 4/021
 - • {based on location controlled areas, e.g. geofencing}
- H04W 4/022
 - • • {with dynamic range variability}
- H04W 4/023
 - • {using mutual or relative location information between multiple location based services [LBS] targets or of distance thresholds}
- H04W 4/025
 - • {using location based information parameters}
- H04W 4/026
 - • • {using orientation information, e.g. compass}
- H04W 4/027
 - • • {using movement velocity, acceleration information}
- H04W 4/028
 - • • {using historical or predicted position information, e.g. trajectory data}
- H04W 4/04
 - • {using association of physical positions and logical data} in a dedicated environment, e.g. buildings or vehicles
- H04W 4/043
 - • • {using ambient awareness, e.g. involving buildings using floor or room numbers}

- H04W 4/046
 - • • {involving vehicles, e.g. floating traffic data [FTD] or vehicle traffic prediction}
- H04W 4/06
 - Selective distribution or broadcast {application services; Mobile application} services to user groups; One-way selective calling services {(connection management for selective distribution or broadcast [H04W 76/002](#); resource management for broadcast services [H04W 72/005](#))}
- H04W 4/08
 - • User group management {(group management mechanisms in peer-to-peer network applications [H04L 67/1044](#); processing of subscriber group data [H04W 8/186](#))}
- H04W 4/10
 - • Push-to-Talk {mobile application services} or Push-on-Call {mobile application} services {(arrangements for real-time multimedia Push-to-X-Services [H04L 65/4061](#); connection management for Push-to-Talk or Push-on-Call services [H04W 76/005](#))}
- H04W 4/12
 - {Mobile application service signalling using} messaging, e.g. SMS [Short Message Service]; {Mobile application service signalling using} mailboxes; {Mobile application service signalling using} announcements, e.g. informing users on the status or progress of a communication request {(message switching systems [H04L 12/58](#); voice mail systems [H04M 3/533](#); arrangements for providing announcements [H04M 3/487](#))}
- H04W 4/14
 - • {Mobile application service signalling using} short messaging services, e.g. SMS or USSD [Unstructured Supplementary Service Data]
- H04W 4/16
 - {Mobile application service signalling using} communication-related supplementary services, e.g. call-transfer or call-hold {(automatic or semi-automatic exchange systems providing special services or facilities to subscribers [H04M 3/42](#))}
- H04W 4/18
 - {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 {(network arrangements or communication protocols for networked applications involving intermediate processing or storage in the network, e.g. proxy, [H04L 67/28](#); message adaptation based on network or terminal capabilities for message switching systems [H04L 12/5825](#))}
- H04W 4/185
 - • {by embedding added-value information into content, e.g. geo-tagging (intermediate arrangements for adding application control or application functional data [H04L 67/2804](#))}
- H04W 4/20
 - {Signalling of application services or} auxiliary data signalling, i.e. transmitting data via a non-traffic channel
- H04W 4/203
 - • {for converged personal network application service interworking, e.g. OMA converged personal network services [CPNS]}
- H04W 4/206
 - • {for socializing or targeting users of the same wireless application service, e.g. joint gesture signalling or mobile advertising signalling (marketing [G06Q 30/02](#); input arrangements for transferring data to be processed into a form capable of being handled by the computer for entering handwritten data [G06F 3/04883](#))}
- H04W 4/22
 - {Mobile application service} emergency connection handling {or mobile application services handling urgent or hazardous situations, e.g. 3GPP earthquake and tsunami warning system [ETWS] (connection management for emergency connection handling [H04W 76/007](#); centralised arrangements for answering calls for emergency applications requiring operator intervention [H04M 3/5116](#))}
- H04W 4/24
 - Accounting or billing

H04W 4/26	<ul style="list-style-type: none"> Usage measurement
H04W 8/00	Network data management
H04W 8/005	<ul style="list-style-type: none"> {Discovery of network devices, e.g. terminals}
H04W 8/02	<ul style="list-style-type: none"> 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
H04W 8/04	<ul style="list-style-type: none"> Registration at HLR or HSS [Home Subscriber Server]
H04W 8/06	<ul style="list-style-type: none"> Registration at serving network Location Register, VLR or user mobility server
H04W 8/065	<ul style="list-style-type: none"> <ul style="list-style-type: none"> {involving selection of the user mobility server}
H04W 8/08	<ul style="list-style-type: none"> Mobility data transfer
H04W 8/082	<ul style="list-style-type: none"> <ul style="list-style-type: none"> {for traffic bypassing of mobility servers, e.g. location registers, home PLMNs or home agents}
H04W 8/085	<ul style="list-style-type: none"> <ul style="list-style-type: none"> {involving hierarchical organized mobility servers, e.g. hierarchical mobile IP [HMIP]}
H04W 8/087	<ul style="list-style-type: none"> <ul style="list-style-type: none"> {for preserving data network PoA address despite hand-offs}
H04W 8/10	<ul style="list-style-type: none"> <ul style="list-style-type: none"> between location register and external networks
H04W 8/12	<ul style="list-style-type: none"> <ul style="list-style-type: none"> between location registers or mobility servers
H04W 8/14	<ul style="list-style-type: none"> <ul style="list-style-type: none"> between corresponding nodes
H04W 8/16	<ul style="list-style-type: none"> <ul style="list-style-type: none"> selectively restricting mobility {data} tracking
H04W 8/18	<ul style="list-style-type: none"> Processing of user or subscriber data, e.g. subscribed services, user preferences or user profiles; Transfer of user or subscriber data
H04W 8/183	<ul style="list-style-type: none"> <ul style="list-style-type: none"> {Processing at user equipment or user record carrier}
H04W 8/186	<ul style="list-style-type: none"> <ul style="list-style-type: none"> {Processing of subscriber group data}
H04W 8/20	<ul style="list-style-type: none"> Transfer of user or subscriber data
H04W 8/205	<ul style="list-style-type: none"> <ul style="list-style-type: none"> {Transfer to or from user equipment or user record carrier}
H04W 8/22	<ul style="list-style-type: none"> Processing or transfer of terminal data, e.g. status or physical capabilities
H04W 8/24	<ul style="list-style-type: none"> Transfer of terminal data
H04W 8/245	<ul style="list-style-type: none"> <ul style="list-style-type: none"> {from a network towards a terminal}
H04W 8/26	<ul style="list-style-type: none"> Network addressing or numbering for mobility support
H04W 8/265	<ul style="list-style-type: none"> <ul style="list-style-type: none"> {for initial activation of new user}
H04W 8/28	<ul style="list-style-type: none"> Number portability; {Network address portability}
H04W 8/30	<ul style="list-style-type: none"> Network data restoration; {Network data reliability; Network data fault tolerance}
H04W 12/00	Security arrangements, e.g. access security or fraud detection; Authentication, e.g. verifying user identity or authorisation; Protecting privacy or anonymity
H04W 12/02	<ul style="list-style-type: none"> Protecting privacy or anonymity
H04W 12/04	<ul style="list-style-type: none"> Key management
H04W 12/06	<ul style="list-style-type: none"> Authentication
H04W 12/08	<ul style="list-style-type: none"> Access security
H04W 12/10	<ul style="list-style-type: none"> Integrity

H04W 12/12

- Fraud detection

H04W 16/00**Network planning, e.g. coverage or traffic planning tools; Network deployment, e.g. resource partitioning or cells structures**

H04W 16/02

- Resource partitioning among network components, e.g. reuse partitioning

H04W 16/04

- • Traffic adaptive resource partitioning

H04W 16/06

- • Hybrid resource partitioning, e.g. channel borrowing

H04W 16/08

- • • Load shedding arrangements

H04W 16/10

- • Dynamic resource partitioning

H04W 16/12

- • Fixed resource partitioning

H04W 16/14

- Spectrum sharing arrangements {between different networks}

H04W 16/16

- • for PBS [Private Base Station] arrangements

H04W 16/18

- Network planning tools

H04W 16/20

- • for indoor coverage or short range network deployment

H04W 16/22

- Traffic simulation tools or models

H04W 16/225

- • {for indoor or short range network}

H04W 16/24

- Cell structures

H04W 16/26

- • Cell enhancers {or enhancement}, e.g. for tunnels, building shadow

H04W 16/28

- • using beam steering

H04W 16/30

- • Special cell shapes, e.g. doughnuts or ring cells

H04W 16/32

- • Hierarchical cell structures

H04W 24/00**Supervisory, monitoring or testing arrangements**

H04W 24/02

- Arrangements for optimizing operational condition

H04W 24/04

- Arrangements for maintaining operational condition

H04W 24/06

- Testing, {supervising or monitoring} using simulated traffic

H04W 24/08

- Testing, {supervising or monitoring} using real traffic

H04W 24/10

- Scheduling measurement reports; {Arrangements for measurement reports}

H04W 28/00**Network traffic or resource management**

H04W 28/02

- Traffic management, e.g. flow control or congestion control

H04W 28/0205

- • {at the air interface (dynamic wireless traffic scheduling [H04W 72/12](#))}

H04W 28/021

- • {in wireless networks with changing topologies, e.g. ad-hoc networks (self-organizing networks [H04W 84/18](#))}

H04W 28/0215

- • {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 [H04W 4/005](#); wireless resource selection or allocation plan definition based on terminal or device properties [H04W 72/048](#))}

H04W 28/0221

- • • {power availability or consumption}

H04W 28/0226

- • {based on location or mobility (handoff or reselection [H04W 36/00](#); mobile application services making use of the location of users or terminals [H04W 4/02](#))}

- H04W 28/0231 . . {based on communication conditions (dynamic wireless traffic scheduling definition based on channel quality criteria [H04W 72/1226](#))}
- H04W 28/0236 . . . {radio quality, e.g. interference, losses or delay}
- H04W 28/0242 . . . {Determining whether packet losses are due to overload or to deterioration of radio communication conditions}
- H04W 28/0247 . . {based on conditions of the access network or the infrastructure network (central resource management [H04W 28/16](#))}
- H04W 28/0252 . . {per individual bearer or channel (dynamic wireless traffic scheduling [H04W 72/12](#))}
- H04W 28/0257 . . . {the individual bearer or channel having a maximum bit rate or a bit rate guarantee}
- H04W 28/0263 . . . {involving mapping traffic to individual bearers or channels, e.g. traffic flow template [TFT]}
- H04W 28/0268 . . {using specific QoS parameters for wireless networks, e.g. QoS class identifier [QCI] or guaranteed bit rate [GBR] (negotiating SLA or negotiating QoS [H04W 28/24](#))}
- H04W 28/0273 . . {adapting protocols for flow control or congestion control to wireless environment, e.g. adapting transmission control protocol [TCP] (wireless network protocols or protocol adaptations to wireless operation, e.g. wireless application protocol [H04W 80/00](#))}
- H04W 28/0278 . . {using buffer status reports (dynamic wireless traffic scheduling definition [H04W 72/1205](#))}
- H04W 28/0284 . . {detecting congestion or overload during communication (monitoring arrangements [H04L 12/2602](#))}
- H04W 28/0289 . . {Congestion control (performing reselection for handling the traffic [H04W 36/22](#); load shedding arrangements in network planning [H04W 16/08](#); dynamic wireless traffic scheduling [H04W 72/12](#))}
- H04W 28/0294 . . {forcing collision (non-scheduled or contention based wireless access channel [H04W 74/08](#))}
- H04W 28/04 . . Error control {, e.g. treating errors, collisions, noise or interference (arrangements for detecting or preventing errors in the information received [H04L 1/00](#))}
- H04W 28/042 . . . {Treating collisions}
- H04W 28/044 {Collision avoidance}
- H04W 28/046 {Collision detection}
- H04W 28/048 . . . {Treating noise or interference (means associated with receiver for limiting or suppressing noise or interference induced by transmission [H04B 1/10](#); baseband systems or shaping networks in transmitter or receiver [H04L 25/03](#))}
- H04W 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](#))}
- H04W 28/065 . . . {using assembly or disassembly of packets}
- H04W 28/08 . . Load balancing or load distribution
- H04W 28/085 . . . {among bearers or channels}

- H04W 28/10 . . Flow control {between communication endpoints}
- H04W 28/12 . . . using signaling between network elements
- H04W 28/14 . . . using intermediate storage
- H04W 28/16 . Central resource management; Negotiation of resources {or communication parameters}, e.g. negotiating bandwidth or QoS [Quality of Service]
- H04W 28/18 . . Negotiating wireless communication parameters
- H04W 28/20 . . . Negotiating bandwidth
- H04W 28/22 . . . Negotiating communication rate
- H04W 28/24 . . Negotiating SLA [Service Level Agreement]; Negotiating QoS [Quality of Service]
- H04W 28/26 . . Resource reservation

H04W 36/00**Hand-off or reselection arrangements****NOTE**

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

- H04W 36/0005 . {Control or signalling for completing the hand-off}
- H04W 36/0011 . . {for data session or connection}
- H04W 36/0016 . . . {for hand-off preparation}
- H04W 36/0022 . . . {for transferring sessions between adjacent core network technologies}
- H04W 36/0027 . . . {for a plurality of sessions or connections, e.g. multi-call, multi-bearer connections}
- H04W 36/0033 . . . {with transfer of context information}
- H04W 36/0038 {of security context information}
- H04W 36/0044 {of quality context information}
- H04W 36/005 . . {involving radio access media independent information, e.g. MIH [Media independent Hand-off]}
- H04W 36/0055 . . {Transmission and use of information for re-establishing the radio link}
- H04W 36/0061 . . . {of neighbor cell information}
- H04W 36/0066 . . . {of control information between different types of networks in order to establish a new radio link in the target network}
- H04W 36/0072 . . . {of resource information of target access point}
- H04W 36/0077 . . . {of access information of target access point}
- H04W 36/0083 . . {Determination of parameters used for hand-off, e.g. generation or modification of neighbour cell lists}
- H04W 36/0088 . . . {Scheduling hand-off measurements}
- H04W 36/0094 . . . {Definition of hand-off measurement parameters}
- H04W 36/02 . Buffering or recovering information during reselection; {Modification of the traffic flow during hand-off}
- H04W 36/023 . . {Buffering or recovering information during reselection}
- H04W 36/026 . . {Multicasting of data during hand-off}
- H04W 36/04 . Reselecting a cell layer in multi-layered cells

H04W 36/06	<ul style="list-style-type: none"> Reselecting a communication resource in the serving access point
H04W 36/08	<ul style="list-style-type: none"> Reselecting an access point
H04W 36/10	<ul style="list-style-type: none"> Reselecting an access point controller
H04W 36/12	<ul style="list-style-type: none"> Reselecting a serving backbone network switching or routing node
H04W 36/14	<ul style="list-style-type: none"> Reselecting a network or an air interface
H04W 36/16	<ul style="list-style-type: none"> Performing reselection for specific purposes
H04W 36/165	<ul style="list-style-type: none"> <ul style="list-style-type: none"> {for improving the overall network performance (H04W 36/18 to H04W 36/22 take precedence)}
H04W 36/18	<ul style="list-style-type: none"> <ul style="list-style-type: none"> for allowing seamless reselection, e.g. soft reselection
H04W 36/20	<ul style="list-style-type: none"> <ul style="list-style-type: none"> for optimizing the interference level
H04W 36/22	<ul style="list-style-type: none"> <ul style="list-style-type: none"> for handling the traffic
H04W 36/24	<ul style="list-style-type: none"> Reselection being triggered by specific parameters {used to improve the performance of a single terminal}
H04W 36/245	<ul style="list-style-type: none"> <ul style="list-style-type: none"> {by historical data}
H04W 36/26	<ul style="list-style-type: none"> <ul style="list-style-type: none"> by agreed or negotiated communication parameters
H04W 36/28	<ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> involving a plurality of connections, e.g. multi-call, multi-bearer connections
H04W 36/30	<ul style="list-style-type: none"> <ul style="list-style-type: none"> by measured or perceived connection quality data
H04W 36/32	<ul style="list-style-type: none"> <ul style="list-style-type: none"> by location or mobility data, e.g. speed data
H04W 36/34	<ul style="list-style-type: none"> Reselection control
H04W 36/36	<ul style="list-style-type: none"> <ul style="list-style-type: none"> by user or terminal equipment
H04W 36/365	<ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> {by manual user interaction}
H04W 36/38	<ul style="list-style-type: none"> <ul style="list-style-type: none"> by fixed network equipment
H04W 36/385	<ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> {of the core network}
H04W 40/00	Communication routing or communication path finding
H04W 40/005	<ul style="list-style-type: none"> {Routing actions in the presence of nodes in sleep or doze mode}
H04W 40/02	<ul style="list-style-type: none"> Communication route or path selection, e.g. power-based or shortest path routing
H04W 40/023	<ul style="list-style-type: none"> <ul style="list-style-type: none"> {Limited or focused flooding to selected areas of a network}
H04W 40/026	<ul style="list-style-type: none"> <ul style="list-style-type: none"> {Route selection considering the moving speed of individual devices}
H04W 40/04	<ul style="list-style-type: none"> <ul style="list-style-type: none"> based on wireless node resources
H04W 40/06	<ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> based on characteristics of available antennas
H04W 40/08	<ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> based on transmission power
H04W 40/10	<ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> based on available power or energy
H04W 40/12	<ul style="list-style-type: none"> <ul style="list-style-type: none"> based on transmission quality or channel quality
H04W 40/125	<ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> {using a measured number of retransmissions as a link metric}
H04W 40/14	<ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> based on stability
H04W 40/16	<ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> based on interference
H04W 40/18	<ul style="list-style-type: none"> <ul style="list-style-type: none"> based on predicted events
H04W 40/20	<ul style="list-style-type: none"> <ul style="list-style-type: none"> based on geographic position or location

H04W 40/205	<ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> {using topographical information, e.g. hills, high rise buildings}
H04W 40/22	<ul style="list-style-type: none"> <ul style="list-style-type: none"> using selective relaying for reaching a BTS [Base Transceiver Station] or an access point
H04W 40/24	<ul style="list-style-type: none"> Connectivity information management, e.g. connectivity discovery or connectivity update
H04W 40/242	<ul style="list-style-type: none"> <ul style="list-style-type: none"> {aging of topology database entries}
H04W 40/244	<ul style="list-style-type: none"> <ul style="list-style-type: none"> {using a network of reference devices, e.g. beaconing}
H04W 40/246	<ul style="list-style-type: none"> <ul style="list-style-type: none"> {Connectivity information discovery}
H04W 40/248	<ul style="list-style-type: none"> <ul style="list-style-type: none"> {Connectivity information update}
H04W 40/26	<ul style="list-style-type: none"> <ul style="list-style-type: none"> for hybrid routing by combining proactive and reactive routing
H04W 40/28	<ul style="list-style-type: none"> <ul style="list-style-type: none"> for reactive routing
H04W 40/30	<ul style="list-style-type: none"> <ul style="list-style-type: none"> for proactive routing
H04W 40/32	<ul style="list-style-type: none"> <ul style="list-style-type: none"> for defining a routing cluster membership
H04W 40/34	<ul style="list-style-type: none"> Modification of an existing route
H04W 40/36	<ul style="list-style-type: none"> <ul style="list-style-type: none"> due to handover
H04W 40/38	<ul style="list-style-type: none"> <ul style="list-style-type: none"> adapting due to varying relative distances between nodes
H04W 48/00	Access restriction; Network selection; Access point selection
H04W 48/02	<ul style="list-style-type: none"> Access restriction performed under specific conditions
H04W 48/04	<ul style="list-style-type: none"> <ul style="list-style-type: none"> based on user or terminal location or mobility data, e.g. moving direction, speed
H04W 48/06	<ul style="list-style-type: none"> <ul style="list-style-type: none"> based on traffic conditions
H04W 48/08	<ul style="list-style-type: none"> Access restriction or access information delivery, e.g. discovery data delivery
H04W 48/10	<ul style="list-style-type: none"> <ul style="list-style-type: none"> using broadcasted information
H04W 48/12	<ul style="list-style-type: none"> <ul style="list-style-type: none"> using downlink control channel
H04W 48/14	<ul style="list-style-type: none"> <ul style="list-style-type: none"> using user query {or user detection}
H04W 48/16	<ul style="list-style-type: none"> Discovering, processing access restriction or access information
H04W 48/17	<ul style="list-style-type: none"> {Selecting a data network PoA [Point of Attachment]}
H04W 48/18	<ul style="list-style-type: none"> Selecting a network or a communication service
H04W 48/20	<ul style="list-style-type: none"> Selecting an access point
H04W 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)}
H04W 52/02	<ul style="list-style-type: none"> Power saving arrangements {(in wired systems H04L 12/12; signaling of mobile application services, e.g. low battery notifications H04W 4/20)}
H04W 52/0203	<ul style="list-style-type: none"> <ul style="list-style-type: none"> {in the radio access network or backbone network of wireless communication networks}
H04W 52/0206	<ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> {in access points, e.g. base stations (access point devices per se H04W 88/08)}
H04W 52/0209	<ul style="list-style-type: none"> <ul style="list-style-type: none"> {in terminal devices (terminal devices per se H04W 88/02)}
H04W 52/0212	<ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> {managed by the network, e.g. network or access point is master and terminal is slave}
H04W 52/0216	<ul style="list-style-type: none"> <ul style="list-style-type: none"> <ul style="list-style-type: none"> {using a pre-established activity schedule, e.g. traffic indication frame}

H04W 52/0219	. . . . {where the power saving management affects multiple terminals}
H04W 52/0222	. . . . {in packet switched networks}
H04W 52/0225	. . . {using monitoring of external events, e.g. the presence of a signal}
H04W 52/0229	. . . . {where the received signal is a wanted signal}
H04W 52/0232	. . . . . {according to average transmission signal activity}
H04W 52/0235	. . . . {where the received signal is a power saving command}
H04W 52/0238	. . . . {where the received signal is an unwanted signal, e.g. interference or idle signal}
H04W 52/0241	. . . . {where no transmission is received, e.g. out of range of the transmitter}
H04W 52/0245	. . . . {according to signal strength}
H04W 52/0248	. . . . {dependent on the time of the day, e.g. according to expected transmission activity}
H04W 52/0251	. . . {using monitoring of local events, e.g. events related to user activity}
H04W 52/0254	. . . . {detecting a user operation or a tactile contact or a motion of the device}
H04W 52/0258	. . . . {controlling an operation mode according to history or models of usage information, e.g. activity schedule or time of day}
H04W 52/0261	. . . {managing power supply demand, e.g. depending on battery level}
H04W 52/0264	. . . . {by selectively disabling software applications}
H04W 52/0267	. . . . {by controlling user interface components}
H04W 52/027	. . . . . {by controlling a display operation or backlight unit}
H04W 52/0274	. . . . {by switching on or off the equipment or parts thereof}
H04W 52/0277	. . . . . {according to available power supply, e.g. switching off when a low battery condition is detected}
H04W 52/028	. . . . . {switching on or off only a part of the equipment circuit blocks}
H04W 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}
H04W 52/0287	. . . . {changing the clock frequency of a controller in the equipment}
H04W 52/029	. . . . . {reducing the clock frequency of the controller}
H04W 52/0293	. . . . . {having a sub-controller with a low clock frequency switching on and off a main controller with a high clock frequency}
H04W 52/0296	. . . . {switching to a backup power supply}
H04W 52/04	. TPC [Transmission power control]
H04W 52/06	. . TPC algorithms
H04W 52/08	. . . Closed loop power control
H04W 52/10	. . . Open loop power control
H04W 52/12	. . . Outer and inner loops
H04W 52/125	. . . . {cascaded outer loop power control}
H04W 52/14	. . . Separate analysis of uplink or downlink
H04W 52/143	. . . . {Downlink power control}

H04W 52/146	. . . . {Uplink power control}
H04W 52/16	. . . Deriving transmission power values from another channel
H04W 52/18	. . TPC being performed according to specific parameters
H04W 52/20	. . . using error rate
H04W 52/22	. . . taking into account previous information or commands
H04W 52/221	. . . . {using past power control commands}
H04W 52/223	. . . . {predicting future states of the transmission}
H04W 52/225	. . . . {Calculation of statistics, e.g. average, variance}
H04W 52/226	. . . . {using past references to control power, e.g. look-up-table}
H04W 52/228	. . . . {using past power values or information}
H04W 52/24	. . . using SIR [Signal to Interference Ratio] or other wireless path parameters
H04W 52/241	. . . . {taking into account channel quality metrics, e.g. SIR, SNR, CIR, Eb/lo}
H04W 52/242	. . . . {taking into account path loss}
H04W 52/243	. . . . {taking into account interferences}
H04W 52/244	. . . . . {Interferences in heterogeneous networks, e.g. among macro and femto or pico cells or other sector / system interference [OSI]}
H04W 52/245	. . . . {taking into account received signal strength}
H04W 52/246	. . . . {where the output power of a terminal is based on a path parameter calculated in said terminal}
H04W 52/247	. . . . {where the output power of a terminal is based on a path parameter sent by another terminal}
H04W 52/248	. . . . {where transmission power control commands are generated based on a path parameter}
H04W 52/26	. . . using transmission rate or quality of service QoS [Quality of Service]
H04W 52/262	. . . . {taking into account adaptive modulation and coding [AMC] scheme (AMC per se H04L 1/0001)}
H04W 52/265	. . . . {taking into account the quality of service QoS}
H04W 52/267	. . . . {taking into account the information rate}
H04W 52/28	. . . using user profile, e.g. mobile speed, priority or network state, e.g. standby, idle or non transmission
H04W 52/281	. . . . {taking into account user or data type priority}
H04W 52/282	. . . . {taking into account the speed of the mobile}
H04W 52/283	. . . . {Power depending on the position of the mobile}
H04W 52/285	. . . . {taking into account the mobility of the user}
H04W 52/286	. . . . {during data packet transmission, e.g. high speed packet access [HSPA]}
H04W 52/287	. . . . {when the channel is in stand-by}
H04W 52/288	. . . . {taking into account the usage mode, e.g. hands-free, data transmission, telephone}
H04W 52/30	. . using constraints in the total amount of available transmission power
H04W 52/32	. . . TPC of broadcast or control channels

H04W 52/322	. . . . {Power control of broadcast channels}
H04W 52/325	. . . . {Power control of control or pilot channels}
H04W 52/327	. . . . {Power control of multicast channels}
H04W 52/34	. . . TPC management, i.e. sharing limited amount of power among users or channels or data types, e.g. cell loading
H04W 52/343	. . . . {taking into account loading or congestion level}
H04W 52/346	. . . . {distributing total power among users or channels}
H04W 52/36	. . . with a discrete range or set of values, e.g. step size, ramping or offsets
H04W 52/362	. . . . {Aspects of the step size}
H04W 52/365	. . . . {Power headroom reporting}
H04W 52/367	. . . . {Power values between minimum and maximum limits, e.g. dynamic range}
H04W 52/38	. . TPC being performed in particular situations
H04W 52/383	. . . {power control in peer-to-peer links}
H04W 52/386	. . . {centralized, e.g. when the radio network controller or equivalent takes part in the power control}
H04W 52/40	. . . during macro-diversity or soft handoff
H04W 52/42	. . . in systems with time, space, frequency or polarisation diversity
H04W 52/44	. . . in connection with interruption of transmission
H04W 52/46	. . . in multi hop networks, e.g. wireless relay networks
H04W 52/48	. . . during retransmission after error or non-acknowledgment
H04W 52/50	. . . at the moment of starting communication in a multiple access environment
H04W 52/52	. . using AGC [Automatic Gain Control] circuits or amplifiers
H04W 52/54	. . Signalisation aspects of the TPC commands, e.g. frame structure
H04W 52/545	. . . {modifying TPC bits in special situations}
H04W 52/56	. . . detection of errors of TPC bits
H04W 52/58	. . . format of the TPC bits
H04W 52/60	. . . using different transmission rates for TPC commands

H04W 56/00**Synchronization arrangements**

H04W 56/0005	. {synchronizing of arrival of multiple uplinks}
H04W 56/001	. {Synchronization between nodes}
H04W 56/0015	. . {one node acting as a reference for the others}
H04W 56/002	. . {Mutual synchronization}
H04W 56/0025	. . {synchronizing potentially movable access points}
H04W 56/003	. {Arrangements to increase tolerance to errors in transmission or reception timing}
H04W 56/0035	. {detecting errors in frequency or phase}
H04W 56/004	. {compensating for timing error of reception due to propagation delay}
H04W 56/0045	. . {compensating for timing error by altering transmission time}
H04W 56/005	. . {compensating for timing error by adjustment in the receiver}

- H04W 56/0055 . {determining timing error of reception due to propagation delay}
- H04W 56/006 . . {using known positions of transmitter and receiver}
- H04W 56/0065 . . {using measurement of signal travel time}
- H04W 56/007 . . . {Open loop measurement}
- H04W 56/0075 {based on arrival time vs. expected arrival time}
- H04W 56/008 {detecting arrival of signal based on received raw signal}
- H04W 56/0085 {detecting a given structure in the signal}
- H04W 56/009 . . . {Closed loop measurements}
- H04W 56/0095 . . {estimated based on signal strength}

H04W 60/00 **Registration, e.g. affiliation to network; De-registration, e.g. terminating affiliation**

- H04W 60/005 . {Multiple registrations, e.g. multihoming}
- H04W 60/02 . by periodical registration
- H04W 60/04 . using triggered events
- H04W 60/06 . De-registration or Detaching

H04W 64/00 **Locating users or terminals {or network equipment} for network management purposes, e.g. mobility management**

- H04W 64/003 . {locating network equipment}
- H04W 64/006 . {with additional information processing, e.g. for direction or speed determination}

H04W 68/00 **Notification of users, e.g. alerting for incoming communication or change of service**

- H04W 68/005 . {Transmission of information for alerting of incoming communication}
- H04W 68/02 . Arrangements for increasing efficiency of notification or paging channel
- H04W 68/025 . . {Indirect paging}
- H04W 68/04 . multi-step notification using statistical or historical mobility data
- H04W 68/06 . using multi-step notification by changing the notification area
- H04W 68/08 . using multi-step notification by increasing the notification area
- H04W 68/10 . using simulcast notification
- H04W 68/12 . Inter-network notification

H04W 72/00 **Local resource management, e.g. wireless traffic scheduling or selection or allocation of wireless resources**

NOTE

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

- H04W 72/005 . {Resource management for broadcast services}
- H04W 72/02 . Selection of wireless resources by user or terminal
- H04W 72/04 . Wireless resource allocation
- H04W 72/0406 . . {involving control information exchange between nodes}

H04W 72/0413	. . . {in uplink direction of a wireless link, i.e. towards network}
H04W 72/042	. . . {in downlink direction of a wireless link, i.e. towards terminal}
H04W 72/0426	. . . {between access points}
H04W 72/0433	. . . {between access point and access point controlling device}
H04W 72/044	. . {where an allocation plan is defined based on the type of the allocated resource}
H04W 72/0446	. . . {the resource being a slot, sub-slot or frame}
H04W 72/0453	. . . {the resource being a frequency, carrier or frequency band}
H04W 72/046	. . . {the resource being in the space domain, e.g. beams}
H04W 72/0466	. . . {the resource being a scrambling code}
H04W 72/0473	. . . {the resource being transmission power}
H04W 72/048	. . {where an allocation plan is defined based on terminal or device properties}
H04W 72/0486	. . {where an allocation plan is defined based on load}
H04W 72/0493	. . {where an allocation plan is defined based on a resource usage policy}
H04W 72/06	. . {where an allocation plan is defined} based on a ranking criteria of the wireless resources
H04W 72/08	. . {where an allocation plan is defined} based on quality criteria
H04W 72/082	. . . {using the level of interference}
H04W 72/085	. . . {using measured or perceived quality}
H04W 72/087	. . . {using requested quality}
H04W 72/10	. . {where an allocation plan is defined} based on priority criteria
H04W 72/12	. {Dynamic} Wireless traffic scheduling; {Dynamically scheduled allocation on shared channel}
H04W 72/1205	. . {Schedule definition, set-up or creation}
H04W 72/121	. . . {for groups of terminals or users}
H04W 72/1215	. . . {for collaboration of different radio technologies}
H04W 72/1221	. . . {based on age of data to be sent}
H04W 72/1226	. . . {based on channel quality criteria, e.g. channel state dependent scheduling}
H04W 72/1231	. . . . {using measured or perceived quality}
H04W 72/1236	. . . . {using requested quality}
H04W 72/1242	. . . {based on precedence or priority of the traffic information}
H04W 72/1247	. . . {based on priority of the information source or recipient}
H04W 72/1252	. . . {based on load}
H04W 72/1257	. . . {based on resource usage policy}
H04W 72/1263	. . {Schedule usage, i.e. actual mapping of traffic onto schedule; Multiplexing of flows into one or several streams; Mapping aspects; Scheduled allocation}
H04W 72/1268	. . . {of uplink data flows}
H04W 72/1273	. . . {of downlink data flows}
H04W 72/1278	. . {Transmission of control information for scheduling}
H04W 72/1284	. . . {in the uplink, i.e. from terminal to network}

- H04W 72/1289 . . . {in the downlink, i.e. towards the terminal}
- H04W 72/1294 {using a grant or specific channel ([H04W 72/14](#) takes precedence)}
- H04W 72/14 . . using a grant {or specific} channel

H04W 74/00**Wireless channel access, e.g. scheduled or random access**

- H04W 74/002 . {Transmission of channel access control information}
- H04W 74/004 . . {in the uplink, i.e. towards network}
- H04W 74/006 . . {in the downlink, i.e. towards the terminal}
- H04W 74/008 . . {with additional processing of random access related information at receiving side}
- H04W 74/02 . Hybrid access techniques
- H04W 74/04 . Scheduled {or contention-free} access
- H04W 74/06 . . using polling
- H04W 74/08 . Non-scheduled {or contention based} access, e.g. random access, ALOHA, CSMA [Carrier Sense Multiple Access]
 - H04W 74/0808 . . {using carrier sensing, e.g. as in CSMA}
 - H04W 74/0816 . . . {carrier sensing with collision avoidance}
 - H04W 74/0825 . . . {carrier sensing with collision detection}
 - H04W 74/0833 . . {using a random access procedure}
 - H04W 74/0841 . . . {with collision treatment}
 - H04W 74/085 {collision avoidance}
 - H04W 74/0858 {collision detection}
 - H04W 74/0866 . . {using a dedicated channel for access}
 - H04W 74/0875 . . . {with assigned priorities based access}
 - H04W 74/0883 . . . {for un-synchronized access}
 - H04W 74/0891 . . . {for synchronized access}

H04W 76/00**Connection management, e.g. connection set-up, manipulation or release**

- H04W 76/002 . {for selective distribution or broadcast}
- H04W 76/005 . . {for Push-to-Talk or Push-on-Call services}
- H04W 76/007 . {for emergency connection handling}
- H04W 76/02 . Connection set-up
 - H04W 76/021 . . {Allocation or use of connection identifiers}
 - H04W 76/022 . . {Set-up of transport tunnels}
 - H04W 76/023 . . {Direct mode set-up}
 - H04W 76/025 . . {Set-up of multiple wireless link connections}
 - H04W 76/026 . . . {involving adjacent core network technologies}
 - H04W 76/027 . . {Management of set-up rejection or failure}
 - H04W 76/028 . . {Connection re-establishment}
- H04W 76/04 . Connection manipulation
 - H04W 76/041 . . {Manipulation of transport tunnels}

- H04W 76/043 . . {Direct mode connection manipulation}
- H04W 76/045 . . {Maintenance of an established connection}
- H04W 76/046 . . {Transitions among RRC [Radio Resource Control] states}
- H04W 76/048 . . {Discontinuous transmission or reception [DTX, DRX]}
- H04W 76/06 . Connection release
- H04W 76/062 . . {Release of transport tunnels}
- H04W 76/064 . . {Selective release of ongoing connections}
- H04W 76/066 . . . {for the purpose of reassigning the resources associated with the released connections}
- H04W 76/068 . . {Connection release triggered by timers}

H04W 80/00 **Wireless network protocols or protocol adaptations to wireless operation, e.g. WAP [Wireless Application Protocol]**

- H04W 80/02 . Data link layer protocols

WARNING

This group is used only for indicating additional information when it is of interest for search

- H04W 80/04 . Network layer protocols, e.g. mobile IP [Internet Protocol]

WARNING

This group is used only for indicating additional information when it is of interest for search

- H04W 80/045 . . {involving different protocol versions, e.g. MIPv4 and MIPv6}

WARNING

This group is used only for indicating additional information when it is of interest for search

- H04W 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](#))}

- H04W 80/08 . Upper layer protocols {(network arrangements or communication protocols for networked applications [H04L 67/00](#))}

- H04W 80/085 . . {involving different upper layer protocol versions, e.g. LCS - SUPL or WSN-SOA-WSDP}

- H04W 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](#))}

- H04W 80/12 . . Application layer protocols, e.g. WAP

H04W 84/00 **Network topologies**

NOTE

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

- H04W 84/005 . {Moving wireless networks}

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

- H04W 88/18 . Service Support; Network management devices
- H04W 88/181 . . {Transcoding devices; Rate adaptation devices}
- H04W 88/182 . . {Network node acting on behalf of an other network entity, e.g. proxy}
- H04W 88/184 . . {Messaging devices, e.g. message centre}
- H04W 88/185 . . {Selective call encoders for paging networks, e.g. paging centre devices}
- H04W 88/187 . . . {using digital or pulse address codes}
- H04W 88/188 . . . {using frequency address codes}

H04W 92/00**Interfaces specially adapted for wireless communication networks**

- H04W 92/02 . Inter-networking arrangements
- H04W 92/04 . Interfaces between hierarchically different network devices
- H04W 92/045 . . {between access point and backbone network device}
- H04W 92/06 . . between gateways and public network devices
- H04W 92/08 . . between user and terminal device
- H04W 92/10 . . between terminal device and access point, i.e. wireless air interface
- H04W 92/12 . . between access points and access point controllers
- H04W 92/14 . . between access point controllers and backbone network device
- H04W 92/16 . Interfaces between hierarchically similar devices
- H04W 92/18 . . between terminal devices
- H04W 92/20 . . between access points
- H04W 92/22 . . between access point controllers
- H04W 92/24 . . between backbone network devices

H04W 99/00**Subject matter not provided for in other groups of this subclass**