SECTION H — ELECTRICITY

H04   ELECTRIC COMMUNICATION TECHNIQUE

H04W   WIRELESS COMMUNICATION NETWORKS [2009.01]

Note(s) [2009.01]

1. This subclass <u>covers</u> :
    - 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. <u>ad hoc</u> 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 <u>does not cover</u> :
    - 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, the first place priority rule is applied, i.e. at each hierarchical level, in the absence of an indication to the contrary, classification is made in the first appropriate place.

4/00   *Services specially adapted for wireless communication networks; Facilities therefor [2009.01, 2018.01]*

> **Note(s) [2018.01]**
>
> *In this group, the first place priority rule is not applied, i.e. the common rule is applied.*

4/02   • *Services making use of location information [2009.01, 2018.01]*

4/021   • • *Services related to particular areas, e.g. point of interest [POI] services, venue services or geofences [2018.01]*

4/024   • • *Guidance services [2018.01]*

4/029   • • *Location-based management or tracking services [2018.01]*

4/06   • Selective distribution of broadcast services, e.g. multimedia broadcast multicast service [MBMS]; Services to user groups; One-way selective calling services **[2009.01]**

4/08   • • User group management **[2009.01]**

4/10   • • Push-to-talk [PTT] or push-on-call services **[2009.01]**

4/12   • Messaging; Mailboxes; Announcements **[2009.01]**

4/14   • • Short messaging services, e.g. short message service [SMS] or unstructured supplementary service data [USSD] **[2009.01]**

4/16   • Communication-related supplementary services, e.g. call-transfer or call-hold **[2009.01]**

4/18   • Information format or content conversion, e.g. adaptation by the network of the transmitted or received information for the purpose of wireless delivery to users or terminals **[2009.01]**

4/20   • *Services signalling; Auxiliary data signalling, i.e. transmitting data via a non-traffic channel [2009.01, 2018.01]*

4/21   • • *for social networking applications [2018.01]*

4/23   • • *for mobile advertising [2018.01]*

4/24   • Accounting or billing **[2009.01]**

4/30   • *Services specially adapted for particular environments, situations or purposes [2018.01]*

4/33   • • *for indoor environments, e.g. buildings [2018.01]*

4/35   • • *for the management of goods or merchandise [2018.01]*

4/38   • • *for collecting sensor information [2018.01]*

4/40   • • *for vehicles, e.g. vehicle-to-pedestrians [V2P] [2018.01]*

4/42   • • • *for mass transport vehicles, e.g. buses, trains or aircraft [2018.01]*

4/44   • • • *for communication between vehicles and infrastructures, e.g. vehicle-to-cloud [V2C] or vehicle-to-home [V2H] [2018.01]*

4/46   • • • *for vehicle-to-vehicle communication [V2V] [2018.01]*

4/48   • • • *for in-vehicle communication [2018.01]*

4/50   • *Service provisioning or reconfiguring [2018.01]*

4/60   • *Subscription-based services using application servers or record carriers, e.g. SIM application toolkits [2018.01]*

4/70   • *Services for machine-to-machine communication [M2M] or machine type communication [MTC] [2018.01]*

4/80   • *Services using short range communication, e.g. near-field communication [NFC], radio-frequency identification [RFID] or low energy communication [2018.01]*

4/90   • *Services for handling of emergency or hazardous situations, e.g. earthquake and tsunami warning systems [ETWS] [2018.01]*

8/00   Network data management [2009.01]

8/02 • Processing of mobility data, e.g. registration information at HLR [Home Location Register] or VLR [Visitor Location Register]; Transfer of mobility data, e.g. between HLR, VLR or external networks **[2009.01]**

8/04 • • Registration at HLR or HSS [Home Subscriber Server] **[2009.01]**

8/06 • • Registration at serving network Location Register, VLR or user mobility server **[2009.01]**

8/08 • • Mobility data transfer **[2009.01]**

8/10 • • • between location register and external networks **[2009.01]**

8/12 • • • between location registers or mobility servers **[2009.01]**

8/14 • • • between corresponding nodes **[2009.01]**

8/16 • • • selectively restricting mobility tracking **[2009.01]**

8/18 • Processing of user or subscriber data, e.g. subscribed services, user preferences or user profiles; Transfer of user or subscriber data **[2009.01]**

8/20 • • Transfer of user or subscriber data **[2009.01]**

8/22 • Processing or transfer of terminal data, e.g. status or physical capabilities **[2009.01]**

8/24 • • Transfer of terminal data **[2009.01]**

8/26 • Network addressing or numbering for mobility support **[2009.01]**

8/28 • • Number portability **[2009.01]**

8/30 • Network data restoration **[2009.01]**

12/00 **Security arrangements, e.g. access security or fraud detection; Authentication, e.g. verifying user identity or authorisation; Protecting privacy or anonymity [2009.01]**

12/02 • Protecting privacy or anonymity **[2009.01]**

12/04 • Key management **[2009.01]**

12/06 • Authentication **[2009.01]**

12/08 • Access security **[2009.01]**

12/10 • Integrity **[2009.01]**

12/12 • Fraud detection **[2009.01]**

16/00 **Network planning, e.g. coverage or traffic planning tools; Network deployment, e.g. resource partitioning or cell structures [2009.01]**

16/02 • Resource partitioning among network components, e.g. reuse partitioning **[2009.01]**

16/04 • • Traffic adaptive resource partitioning **[2009.01]**

16/06 • • Hybrid resource partitioning, e.g. channel borrowing **[2009.01]**

16/08 • • • Load shedding arrangements **[2009.01]**

16/10 • • Dynamic resource partitioning **[2009.01]**

16/12 • • Fixed resource partitioning **[2009.01]**

16/14 • Spectrum sharing arrangements **[2009.01]**

16/16 • • for PBS [Private Base Station] arrangements **[2009.01]**

16/18 • Network planning tools **[2009.01]**

16/20 • • for indoor coverage or short range network deployment **[2009.01]**

16/22 • Traffic simulation tools or models **[2009.01]**

16/24 • Cell structures **[2009.01]**

16/26 • • Cell enhancers, e.g. for tunnels or building shadow **[2009.01]**

16/28 • • using beam steering **[2009.01]**

16/30 • • Special cell shapes, e.g. doughnuts or ring cells **[2009.01]**

16/32 • • Hierarchical cell structures **[2009.01]**

24/00 **Supervisory, monitoring or testing arrangements [2009.01]**

24/02 • Arrangements for optimising operational condition **[2009.01]**

24/04 • Arrangements for maintaining operational condition **[2009.01]**

24/06 • Testing using simulated traffic **[2009.01]**

24/08 • Testing using real traffic **[2009.01]**

24/10 • Scheduling measurement reports **[2009.01]**

28/00 **Network traffic or resource management [2009.01]**

28/02 • Traffic management, e.g. flow control or congestion control **[2009.01]**

28/04 • • Error control **[2009.01]**

28/06 • • Optimising, e.g. header compression, information sizing **[2009.01]**

28/08 • • Load balancing or load distribution **[2009.01]**

28/10 • • Flow control **[2009.01]**

28/12 • • • using signalling between network elements **[2009.01]**

28/14 • • • using intermediate storage **[2009.01]**

28/16 • Central resource management; Negotiation of resources, e.g. negotiating bandwidth or QoS [Quality of Service] **[2009.01]**

28/18 • • Negotiating wireless communication parameters **[2009.01]**

28/20 • • • Negotiating bandwidth **[2009.01]**

28/22 • • • Negotiating communication rate **[2009.01]**

28/24 • • Negotiating SLA [Service Level Agreement]; Negotiating QoS [Quality of Service] **[2009.01]**

28/26 • • Resource reservation **[2009.01]**

36/00 **Handoff or reselecting arrangements [2009.01]**

36/02 • Buffering or recovering information during reselection **[2009.01]**

36/04 • Reselecting a cell layer in multi-layered cells **[2009.01]**

36/06 • Reselecting a communication resource in the serving access point **[2009.01]**

36/08 • Reselecting an access point **[2009.01]**

36/10 • Reselecting an access point controller **[2009.01]**

36/12 • Reselecting a serving backbone network switching or routing node **[2009.01]**

36/14 • Reselecting a network or an air interface **[2009.01]**

36/16 • Performing reselection for specific purposes **[2009.01]**

36/18 • • for allowing seamless reselection, e.g. soft reselection **[2009.01]**

36/20 • • for optimising the interference level **[2009.01]**

36/22 • • for handling the traffic **[2009.01]**

36/24 • Reselection being triggered by specific parameters **[2009.01]**

36/26 • • by agreed or negotiated communication parameters **[2009.01]**

36/28 • • • involving a plurality of connections, e.g. multi-call or multi-bearer connections **[2009.01]**

36/30 • • by measured or perceived connection quality data **[2009.01]**

36/32 • • by location or mobility data, e.g. speed data **[2009.01]**

36/34 • Reselection control **[2009.01]**

36/36 • • by user or terminal equipment **[2009.01]**

36/38 • • by fixed network equipment **[2009.01]**

40/00 **Communication routing or communication path finding [2009.01]**

40/02	• Communication route or path selection, e.g. power-based or shortest path routing **[2009.01]**
40/04	• • based on wireless node resources **[2009.01]**
40/06	• • • based on characteristics of available antennas **[2009.01]**
40/08	• • • based on transmission power **[2009.01]**
40/10	• • • based on available power or energy **[2009.01]**
40/12	• • based on transmission quality or channel quality **[2009.01]**
40/14	• • • based on stability **[2009.01]**
40/16	• • • based on interference **[2009.01]**
40/18	• • based on predicted events **[2009.01]**
40/20	• • based on geographic position or location **[2009.01]**
40/22	• • using selective relaying for reaching a BTS [Base Transceiver Station] or an access point **[2009.01]**
40/24	• Connectivity information management, e.g. connectivity discovery or connectivity update **[2009.01]**
40/26	• • for hybrid routing by combining proactive and reactive routing **[2009.01]**
40/28	• • for reactive routing **[2009.01]**
40/30	• • for proactive routing **[2009.01]**
40/32	• • for defining a routing cluster membership **[2009.01]**
40/34	• Modification of an existing route **[2009.01]**
40/36	• • due to handover **[2009.01]**
40/38	• • adapting due to varying relative distances between nodes **[2009.01]**

48/00 Access restriction; Network selection; Access point selection [2009.01]

48/02	• Access restriction performed under specific conditions **[2009.01]**
48/04	• • based on user or terminal location or mobility data, e.g. moving direction or speed **[2009.01]**
48/06	• • based on traffic conditions **[2009.01]**
48/08	• Access restriction or access information delivery, e.g. discovery data delivery **[2009.01]**
48/10	• • using broadcasted information **[2009.01]**
48/12	• • using downlink control channel **[2009.01]**
48/14	• • using user query **[2009.01]**
48/16	• Discovering; Processing access restriction or access information **[2009.01]**
48/18	• Selecting a network or a communication service **[2009.01]**
48/20	• Selecting an access point **[2009.01]**

52/00 Power management, e.g. TPC [Transmission Power Control], power saving or power classes [2009.01]

52/02	• Power saving arrangements **[2009.01]**
52/04	• TPC [Transmission power control] **[2009.01]**
52/06	• • TPC algorithms **[2009.01]**
52/08	• • • Closed loop power control **[2009.01]**
52/10	• • • Open loop power control **[2009.01]**
52/12	• • • Outer and inner loops **[2009.01]**
52/14	• • • Separate analysis of uplink or downlink **[2009.01]**
52/16	• • • Deriving transmission power values from another channel **[2009.01]**
52/18	• • TPC being performed according to specific parameters **[2009.01]**
52/20	• • • using error rate **[2009.01]**
52/22	• • • taking into account previous information or commands **[2009.01]**
52/24	• • • using SIR [Signal to Interference Ratio] or other wireless path parameters **[2009.01]**

52/26	• • • using transmission rate or quality of service QoS [Quality of Service] **[2009.01]**
52/28	• • • using user profile, e.g. mobile speed, priority or network state, e.g. standby, idle or non-transmission **[2009.01]**
52/30	• • using constraints in the total amount of available transmission power **[2009.01]**
52/32	• • • TPC of broadcast or control channels **[2009.01]**
52/34	• • • TPC management, i.e. sharing limited amount of power among users or channels or data types, e.g. cell loading **[2009.01]**
52/36	• • • with a discrete range or set of values, e.g. step size, ramping or offsets **[2009.01]**
52/38	• • TPC being performed in particular situations **[2009.01]**
52/40	• • • during macro-diversity or soft handoff **[2009.01]**
52/42	• • • in systems with time, space, frequency or polarisation diversity **[2009.01]**
52/44	• • • in connection with interruption of transmission **[2009.01]**
52/46	• • • in multi-hop networks, e.g. wireless relay networks **[2009.01]**
52/48	• • • during retransmission after error or non-acknowledgment **[2009.01]**
52/50	• • • at the moment of starting communication in a multiple access environment **[2009.01]**
52/52	• • using AGC [Automatic Gain Control] circuits or amplifiers **[2009.01]**
52/54	• • Signalisation aspects of the TPC commands, e.g. frame structure **[2009.01]**
52/56	• • • Detection of errors of TPC bits **[2009.01]**
52/58	• • • Format of the TPC bits **[2009.01]**
52/60	• • • using different transmission rates for TPC commands **[2009.01]**

56/00 Synchronisation arrangements [2009.01]

60/00 Registration, e.g. affiliation to network; De-registration, e.g. terminating affiliation [2009.01]

60/02	• by periodical registration **[2009.01]**
60/04	• using triggered events **[2009.01]**
60/06	• De-registration or detaching **[2009.01]**

64/00 Locating users or terminals for network management purposes, e.g. mobility management [2009.01]

68/00 Notification of users, e.g. alerting for incoming communication or change of service [2009.01]

68/02	• Arrangements for increasing efficiency of notification or paging channel **[2009.01]**
68/04	• multi-step notification using statistical or historical mobility data **[2009.01]**
68/06	• using multi-step notification by changing the notification area **[2009.01]**
68/08	• using multi-step notification by increasing the notification area **[2009.01]**
68/10	• using simulcast notification **[2009.01]**
68/12	• Inter-network notification **[2009.01]**

72/00 Local resource management, e.g. selection or allocation of wireless resources or wireless traffic scheduling [2009.01]

72/02	• Selection of wireless resources by user or terminal **[2009.01]**
72/04	• Wireless resource allocation **[2009.01]**

72/06 • • based on ranking criteria of the wireless resources **[2009.01]**

72/08 • • based on quality criteria **[2009.01]**

72/10 • • based on priority criteria **[2009.01]**

72/12 • Wireless traffic scheduling **[2009.01]**

72/14 • • using a grant channel **[2009.01]**

74/00 **Wireless channel access, e.g. scheduled or random access [2009.01]**

74/02 • Hybrid access techniques **[2009.01]**

74/04 • Scheduled access **[2009.01]**

74/06 • • using polling **[2009.01]**

74/08 • Non-scheduled access, e.g. random access, ALOHA or CSMA [Carrier Sense Multiple Access] **[2009.01]**

76/00 *Connection management [2009.01, 2018.01]*

Note(s) [2018.01]

In this main group, the first place priority rule is not applied, i.e. the common rule is applied.

76/10 • *Connection setup [2018.01]*

76/11 • • *Allocation or use of connection identifiers [2018.01]*

76/12 • • *Setup of transport tunnels [2018.01]*

76/14 • • *Direct-mode setup [2018.01]*

76/15 • • *Setup of multiple wireless link connections [2018.01]*

76/16 • • • *involving different core network technologies, e.g. a packet-switched [PS] bearer in combination with a circuit-switched [CS] bearer [2018.01]*

76/18 • • *Management of setup rejection or failure [2018.01]*

76/19 • • *Connection re-establishment [2018.01]*

76/20 • *Manipulation of established connections [2018.01]*

76/22 • • *Manipulation of transport tunnels [2018.01]*

76/23 • • *Manipulation of direct-mode connections [2018.01]*

76/25 • • *Maintenance of established connections [2018.01]*

76/27 • • *Transitions between radio resource control [RRC] states [2018.01]*

76/28 • • *Discontinuous transmission [DTX]; Discontinuous reception [DRX] [2018.01]*

76/30 • *Connection release [2018.01]*

76/32 • • *Release of transport tunnels [2018.01]*

76/34 • • *Selective release of ongoing connections [2018.01]*

76/36 • • • *for reassigning the resources associated with the released connections [2018.01]*

76/38 • • *triggered by timers [2018.01]*

76/40 • *for selective distribution or broadcast [2018.01]*

76/45 • • *for push-to-talk [PTT] or push-to-talk over cellular [PoC] services [2018.01]*

76/50 • *for emergency connections [2018.01]*

80/00 **Wireless network protocols or protocol adaptations to wireless operation, e.g. WAP [Wireless Application Protocol] [2009.01]**

80/02 • Data link layer protocols **[2009.01]**

80/04 • Network layer protocols, e.g. mobile IP [Internet Protocol] **[2009.01]**

80/06 • Transport layer protocols, e.g. TCP [Transport Control Protocol] over wireless **[2009.01]**

80/08 • Upper layer protocols **[2009.01]**

80/10 • • adapted for session management, e.g. SIP [Session Initiation Protocol] **[2009.01]**

80/12 • • Application layer protocols, e.g. WAP **[2009.01]**

84/00 **Network topologies [2009.01]**

84/02 • Hierarchically pre-organised networks, e.g. paging networks, cellular networks, WLAN [Wireless Local Area Network] or WLL [Wireless Local Loop] **[2009.01]**

84/04 • • Large scale networks; Deep hierarchical networks **[2009.01]**

84/06 • • • Airborne or Satellite Networks **[2009.01]**

84/08 • • • Trunked mobile radio systems **[2009.01]**

84/10 • • Small scale networks; Flat hierarchical networks **[2009.01]**

84/12 • • • WLAN [Wireless Local Area Networks] **[2009.01]**

84/14 • • • WLL [Wireless Local Loop]; RLL [Radio Local Loop] **[2009.01]**

84/16 • • • WPBX [Wireless Private Branch Exchange] **[2009.01]**

84/18 • Self-organising networks, e.g. ad hoc networks or sensor networks **[2009.01]**

84/20 • • Master-slave arrangements **[2009.01]**

84/22 • • with access to wired networks **[2009.01]**

88/00 **Devices specially adapted for wireless communication networks, e.g. terminals, base stations or access point devices [2009.01]**

88/02 • Terminal devices **[2009.01]**

88/04 • • adapted for relaying to or from another terminal or user **[2009.01]**

88/06 • • adapted for operation in multiple networks, e.g. multi-mode terminals **[2009.01]**

88/08 • Access point devices **[2009.01]**

88/10 • • adapted for operation in multiple networks, e.g. multi-mode access points **[2009.01]**

88/12 • Access point controller devices **[2009.01]**

88/14 • Backbone network devices **[2009.01]**

88/16 • Gateway arrangements **[2009.01]**

88/18 • Service support; Network management devices **[2009.01]**

92/00 **Interfaces specially adapted for wireless communication networks [2009.01]**

92/02 • Inter-networking arrangements **[2009.01]**

92/04 • Interfaces between hierarchically different network devices **[2009.01]**

92/06 • • between gateways and public network devices **[2009.01]**

92/08 • • between user and terminal device **[2009.01]**

92/10 • • between terminal device and access point, i.e. wireless air interface **[2009.01]**

92/12 • • between access points and access point controllers **[2009.01]**

92/14 • • between access point controllers and backbone network device **[2009.01]**

92/16 • Interfaces between hierarchically similar devices **[2009.01]**

92/18 • • between terminal devices **[2009.01]**

92/20 • • between access points **[2009.01]**

92/22 • • between access point controllers **[2009.01]**

92/24 • • between backbone network devices **[2009.01]**

99/00 **Subject matter not provided for in other groups of this subclass [2009.01]**