CLAIMS

1. A communication system having a core and comprising:

a multihop cellular network including base stations serving mobile stations and a plurality of relays having mobile station functionality, base station functionality and backhauling link functionality, and operable to manage quality-of-service (QoS) of at least one of the mobile stations, wherein

at least one relay of the plurality of relays comprises a mobile cellular communication network node operative to:

serve, including communicating via antennae, at least one of the mobile stations or other relays of the plurality of relays different than the at least one relay, and

to be served by at least one of the base stations or other relays,

the node includes:

a first radio manager;

mobile communicator means which communicates via antennae with at least one selectable base station; and

base station functionality which has a physical back-connection to the first radio manager,

the first radio manager has a physical connection with the mobile communicator means,

for at least one individual relay from among said plurality of relays, a backhauling link of the individual relay has QoS management functionality in order to support the QoS of at least one of the mobile stations, and

the at least one individual relay requests at least one bearer each having a defined quality of service, defined by a cellular protocol to characterize a communication channel, from its serving base station, and uses said at least one bearer for supporting the QoS of at least one of the mobile stations,

QoS priority management is provided in at least one of a base station and a relay which translates to a quality of service class indicator, used in a cellular protocol governing the network, to differentiate different applications' QoS parameters,

per-bearer differentiation in a multi-hop base station relay system is achieved by managing QoS in at least one of said base stations rather than in a central manager,

for different bearers which have different quality of service class indicators and which enter serving base stations,

the backhauling link functionality in each relay in said plurality of relays has its own set of predefined backhauling bearers with its own predefined quality of service indication field,

the base station functionalities of at least some relays in said plurality of relays are configured to map packets that are sent to the core to the quality of service indication field, and

backhauling link functionalities of at least some relays in said plurality of relays are configured for an inverse mapping of packet classification information to the quality of service indication field.

2. The system according to claim 1, wherein the first radio manager comprises:

a radio resource manager; and

functionality for receiving information from, and sending information to, other radio managers, respectively co-located with other relays, and for using the information to determine whether to reject at least one mobile communicator seeking to be served by an individual base station associated with the first radio manager.

3. The system according to claim 1, wherein the bearer requested is of size S for each service requiring a bit rate B, to which at least one of relays and mobile communication devices below said individual relay have registered.

4. The system according to claim 3, wherein said size S is no less than the number of relays and mobile communication devices below said individual relay registered for said service, times said bit rate B.

5. The system according to claim 1, wherein

the network has at least one base station B operative to receive resource allocation requests and to allocate uplink bandwidth accordingly,

the plurality of relays include at least one mobile relay apparatus having means for providing base station and mobile station functionalities which manage the QoS using respective first and second QoS management parameters and being operative to:

convey to the base station B a resource allocation request regarding bandwidth needs, in uplink, of mobile communicators associated with the at least one mobile relay apparatus, and

when receiving uplink bandwidth, from a base station which generates an uplink between the at least one mobile relay apparatus and the base station B, distribute the uplink bandwidth between mobile communicators associated with the at least one mobile relay apparatus, and

said needs are expressed at a service\application requirement level.

6. The system according to claim 1, wherein

the plurality of relays have links, and are operative to perform load-balancing, including balancing of QoS parameters, of at least a subset of the links in said network, by ordering hand-overs,

the at least one relay further comprises a mobile cellular communication network node N operative to:

serve, including communicating via the antennae, at least one of the mobile communicators and other relays, and

to be served by at least one of the base stations and other relays,

the node N includes:

a first radio manager,

mobile communicator functionality which communicates via the antennae with at least one selectable base station; and

base station functionality which has a physical back-connection to the first radio manager, and

the first radio manager of the node N has a physical connection with the mobile communicator functionality.

7. The system according to claim 1, wherein relay base stations are configured to map packets sent to the core according to a table translating a differentiated services code point (DSCP) to the quality of service class indicator.

8. The system according to claim 1, wherein at least one relay backhauling link functionality is configured to use an inverse table providing translation of the differentiated services code point (DSCP) to the quality of service class indicator such that an entering bearer having a particular quality of service class indicator is forwarded over a GTP (general packet radio service (GPRS) Tunneling Protocol) tunnel having a certain differentiated services code point (DSCP) value in its IP (Internet protocol) header type of service (ToS) field and then, a packet having said certain value in its IP header's TOS field is mapped to said particular quality of service class indicator.

9. A communication method operative in conjunction with a multihop cellular network including a core and base stations serving mobile stations and a plurality of relays having mobile station functionality, base station functionality, and backhauling link functionality and operable to manage quality-of-service (QoS) of at least one of the mobile stations, the method comprising:

providing at least one relay of the plurality of relays comprises a mobile cellular communication network node operative to:

serve, including communicating via antennae, at least one of the mobile stations or other relays of the plurality of relays different than the at least one relay, and

to be served by at least one of the base stations or other relays, wherein

the node includes:

a first radio manager,

mobile communicator means which communicates via antennae with at least one selectable base station, and

base station functionality which has a physical back-connection to the first radio manager,

the first radio manager has a physical connection with the mobile communicator means,

for at least one individual relay from among said plurality of relays, a backhauling link of the individual relay has QoS management functionality in order to support the QoS of at least one of the mobile stations,

the at least one individual relay requests at least one bearer each having a defined quality of service, defined by a cellular protocol to characterize a communication channel, from its serving base station, and uses said at least one bearer for supporting the QoS of at least one of the mobile stations,

QoS priority management is provided in at least one of a base station and a relay which translates to a quality of service class indicator, used in a cellular protocol governing the network, to differentiate different applications' QoS parameters,

per-bearer differentiation in a multi-hop base station relay system is achieved by managing QoS in at least one of said base stations rather than in a central manager,

for different bearers which have different quality of service class indicators and which enter serving base stations,

the backhauling link functionality in each relay in said plurality of relays has its own set of predefined backhauling bearers with its own predefined quality of service indication field,

the base station functionalities of at least some relays in said plurality of relays are configured to map packets that are sent to the core to the quality of service class indication field, and

backhauling link functionalities of at least some relays in said plurality of relays are configured for an inverse mapping of packet classification information to the quality of service indication field.

10. The method according to claim 9, wherein said network is operable to manage a QOS of at least said node.

11. The method according to claim 9, wherein said QoS of at least one of the mobile stations is managed by chaining bearers.

12. The method according to claim 9, wherein said network has a topology and wherein QOS management is performed by using initiated handovers to change the network topology.

13. A communication method comprising:

providing a muliihop cellular network including base stations serving mobile stations and a plurality of relays having means for providing mobile station functionality and operable to manage quality-of-scrvice (QOS) of at least one of the mobile stations, wherein

at least one relay of the plurality of relays comprises a mobile cellular communication network node operative to:

serve, including communicating via antennae, at least one of the mobile stations or other relays of the plurality of relays different than the at least one relay, and

to be served by at least one of the base stations or other relays, the node includes:

a first radio manager RM,

mobile communicator means which communicates via antennae with at least one selectable base station; and

base station means which has a physical back-connection to the first radio manager,

the first radio manager RM has a physical connection with the mobile communicator means, and also comprises providing for the at least one individual relay from among the plurality of relays, a backhauling link of the individual relay having QoS management functionality in order to support the QoS of at least one of the mobile stations, and

said at least one individual relay requests at least one bearer, defined by a cellular protocol to characterize a communication channel, from its serving base station, and uses said at least one bearer for supporting the QOS of at least one of the mobile stations.

14. A computer program product comprising a non-transitory tangible computer readable medium having computer readable program code embodied therein, said computer readable program code adapted to be executed to implement a communication method operative in conjunction with a multihop cellular network including a core and base stations serving mobile stations and a plurality of relays having mobile station functionality, base station functionality, and backhauling link functionality and operable to manage quality-of-service (QoS) of at least one of the mobile stations, the communication method comprising:

providing at least one relay of the plurality of relays comprises a mobile cellular communication network node operative to:

serve, including communicating via antennae, at least one of the mobile stations or other relays of the plurality of relays different than the at least one relay, and

to be served by at least one of the base stations or other relays, wherein

the node includes:

a first radio manager,

mobile communicator means which communicates via antennae with at least one selectable base station, and

base station functionality which has a physical back-connection to the first radio manager,

the first radio manager has a physical connection with the mobile communicator means,

for at least one individual relay from among said plurality of relays, a backhauling link of the individual relay has QoS management functionality in order to support the QoS of at least one of the mobile stations,

the at least one individual relay requests at least one bearer each having a defined quality of service, defined by a cellular protocol to characterize a communication channel, from its serving base station, and uses said at least one bearer for supporting the QoS of at least one of the mobile stations,

QoS priority management is provided which translates to a quality of service class indicator, used in a cellular protocol governing the network, to differentiate different applications' QoS parameters,

per-bearer differentiation in a multi-hop base station relay system is achieved by managing QoS in the at least one of said base stations rather than in a central manager,

for different bearers which have different quality of service class indicators and which enter serving base stations,

the backhauling link functionality in each relay in said plurality of relays has its own set of predefined backhauling bearers with its own predefined quality of service indication field,

the base station functionalities of at least some relays in said plurality of relays are configured to map packets that are sent to the core to the quality of service class indication field, and

backhauling link functionalities of at least some relays in said plurality of relays are configured for an inverse mapping of packet classification information to the quality of service indication field.