Claims

1. A satellite payload, comprising:

a network node, wherein the network node comprises:

a transmission interface for transmitting radio frequency signals;

a reception interface for receiving radio frequency signals;

wherein the transmission and reception interfaces are arranged to interface with a terrestrial network and a space-borne network;

a network management module arranged to determine handover control and radio resource management information using the positions and availabilities of communications resources in the terrestrial and the space-borne network;

a controller arranged to control the transmission interface and the reception interface in accordance with the handover control and radio resource management information determined by the network management module to allow the satellite to operate as part of the terrestrial network.

2. A satellite payload according to claim 1, wherein the radio resource management information includes resource allocation information.

3. A satellite payload according to claim 2, wherein resource allocation information includes information relating to communications traffic and the position and availability of network entities.

4. A satellite payload according to claim 2 or claim 3, wherein the resource allocation information comprises frequency use information, wherein the frequency use information enables signals transmitted and/or received by the respective transmission and/or reception interfaces to co-exist with signals associated with external space-based and/or terrestrial users without interference.

5. A satellite payload according to any one of the preceding claims which provides the same network control functionality as the interface between a user equipment device and a packet core in a terrestrial network.

6. A satellite payload according to claim 5, wherein the terrestrial network is an LTE network, and the network node provides the same network control functionality as an Evolved Node B.

7. A satellite payload according to any one of the preceding claims comprising means for encrypting and decrypting data.

8. A satellite payload according to any one of the preceding claims in which the network management module is arranged to determine session information for:

a first communication mode for communication to an entity in the terrestrial network via a satellite gateway;

a second communication mode for direct communication to an entity in terrestrial network;

a third communication mode for direct communication to a ground-based gateway to the terrestrial network; and

a fourth communication mode for communication with another satellite.

9. A network entity comprising a satellite payload according to any one of the preceding claims and further comprising a plurality of adaptive antennas connected to the transmission and reception interfaces, in which the plurality of adaptive antennas support multiple input multiple output, MIMO, air interfaces.

10. A network entity according to claim 9 in which the adaptive antennas are configured to allow adaptive beam coverage for in-orbit dynamic reconfiguration to optimise the beam set for traffic patterns and location, and interference mitigation.

11. A network entity according to claim 9 or claim 10, comprising an inter-satellite link interface.

12. A network entity according to claim 10 or claim 11 in which the controller is arranged to interface with the controller of a satellite.

13. A satellite comprising the network entity of any one of claims 9 to 12 for use in any or a combination of a geostationary orbit, geosynchronous, Low Earth Orbit, and a Medium Earth Orbit.

14. A system comprising the satellite of claim 13 and a user equipment device configured for communication the satellite.