

ABSTRACT

End-to-end beamforming systems (500) include end-to-end relays (503, 1202, 3403) and ground networks (502) to provide communications to user terminals (517) located in user beam coverage areas (519). The ground segment can include geographically distributed access nodes (515) and a central processing system (505). Return uplink signals (525), transmitted from the user terminals, have multipath induced by a plurality of receive/transmit signal paths (1702) in the end to end relay and are relayed to the ground network. The ground network, using beamformers (513, 531), recovers user data streams transmitted by the user terminals from return downlink signals (527). The ground network, using beamformers (513, 529) generates forward uplink signals (521) from appropriately weighted combinations of user data streams that, after relay by the end-end-relay, produce forward downlink signals (522) that combine to form user beams.

[Figure 5]