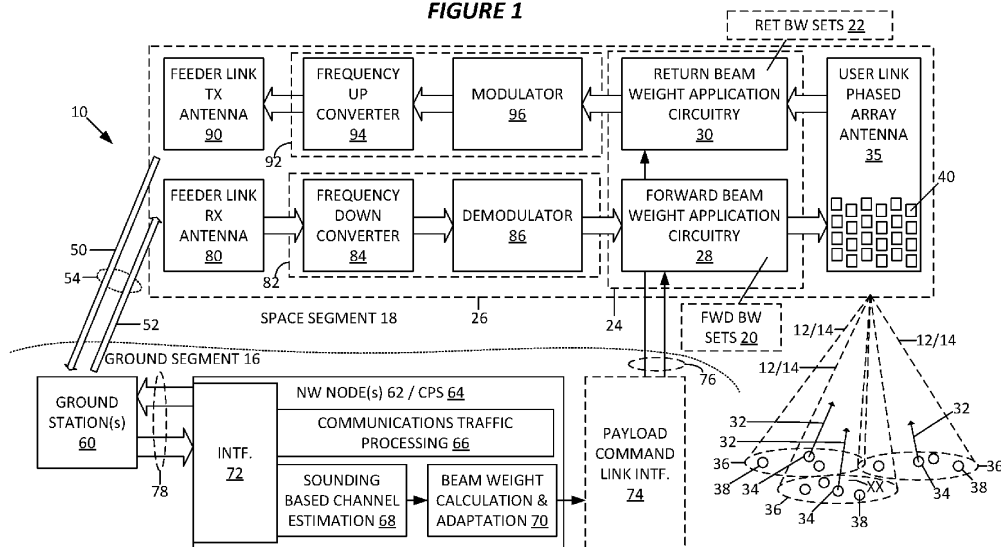




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(54) Title: METHODS AND APPARATUSES FOR BEAMFORMING IN A SATELLITE COMMUNICATIONS SYSTEM

FIGURE 1



(57) **Abstract:** Disclosed methods and apparatuses embody an advantageous beamforming technique applied in a satellite communications system (SCS). A ground segment of the SCS computes beam weights for use by a beamformer onboard a satellite. Beam weight computation depends on the satellite providing the ground segment with per element sounding signals corresponding to reception by a phased array antenna onboard the satellite of channel sounding signals from one or more user terminals (UTs) located in a user beam coverage area. Having access to these per element sounding signals supports ground-based estimation of the propagation channels between the phased array antenna and the UT(s), with the beam weights calculated from channel estimates and output for uplink transmission to the satellite. In one or more embodiments, the onboard beamformer operates in a digital domain, with the beam weights being digital values.

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