The MIT Haystack Observatory, with funding from NASA Space Geodesy Project (SGP), is developing a receiver upgrade for the 12m VLBI radio telescope installed at the Goddard Geophysical Astronomical Observatory in Greenbelt, MD. The first stages of upgrade to the receiver frontend incorporate the quadruple-ridge flared horn (QRFH) and CRYO1-12 LNA, both components of which were designed at the California Institute of Technology. In contrast to the first prototype, the new frontend will incorporate a custom diplexer network which will provide for each of the two polarizations two independent, spectrally-overlapped receiver sections consisting of a low and high-band section. The low-band receiver section will operate from 2.2 to 5 GHz with the received signals conveyed to the control room over coaxial cable. The high-band receiver section will operate from 4.5 to 14 GHz, and these signals will be downlinked to the control room by means of a microwave-over-fiber system.

The microwave-over-fiber system is the dynamic range limiting component of the high-band receiver. The function of the diplexer network is to segregate the strong S-band radio frequency interference from the high-band section in order provide adequate high-band dynamic range. The spectral-overlap design of the diplexer network also provides the necessary spectral compatibility with the SGP requirements. Since the dynamic range of the microwave-over-fiber system is not uniform in frequency, a custom equalized preamp stage was designed to optimize the dynamic range of the high-band receiver. The details of the receiver upgrade system architecture will be presented in this contribution.

The upgrade to the radio telescope will also incorporate a modern, mechanized positioning system that will facilitate routine maintenance and operation of the radio telescope. An overview of the new frontend positioner system will also be presented.