The ngVLA will provide continuous frequency coverage from ~10 – 50 GHz in multiple bands, with options for a 3mm band at 70 – 116 GHz and extended low-frequency coverage to 1.2 GHz. Receivers will be cryogenically-cooled, and the receiver cryostats integrating multiple receiver bands to the extent possible, for reduced maintenance and operations costs. The total number of bands required strongly depends on their fractional bandwidth: maximizing this reduces the band count and number of cryostats, but with a significant penalty in overall sensitivity.

For optimum performance at the higher frequencies, waveguide-bandwidth (~1.66:1) receivers are proposed to cover 11 – 50 GHz and 70 – 116 GHz in four separate bands, possibly integrated into a single cryostat. Excellent LNA noise performance is readily achievable, and the use of waveguide components instead of coax significantly reduces loss and associated noise contributions, without adding undue size or weight. Standard corrugated conical feeds are also used, providing both good aperture efficiency and symmetric, uniform beam shape over frequency, resulting in a high overall G/T. Feeds in the upper two bands are also cooled for reduced loss; it may be possible to cool one or even both of the lower-band feeds as well, depending on the design of the antenna optics.

For continuous coverage between 1.2 – 11 GHz, waveguide or octave-bandwidth receivers are not practical, as 4 to 5 receiver/feed combinations would be needed to cover the ~9:1 frequency range. The large physical size of the feeds and waveguide polarizers would likely mandate individual cryostats for each band, very costly in a large array. A possible compromise would be to have two 3:1-bandwidth receivers, with wideband coaxial LNAs. If a broad beam angle is needed, the Caltech-designed quad-ridge feed horn could be used, cryogenically cooled to reduce losses ahead of the LNAs. Alternatively, if a narrower beam angle was required, an acceptable option might be a wideband conical, overmoded waveguide feed and cooled OMT, like those developed at CSIRO for the Narrabri compact array upgrade. Aperture efficiency and LNA noise temperature are somewhat degraded in both the above options: however, there would be a significant operational cost savings, by effectively halving the number of cryostats per antenna.