

# Application Note: Long-range Wireless Internet Link

## Objective

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Provide a high-speed wireless data link for the purpose of Internet connectivity. The link must cover a total distance of 35 miles and must include firewall protection.

## Equipment

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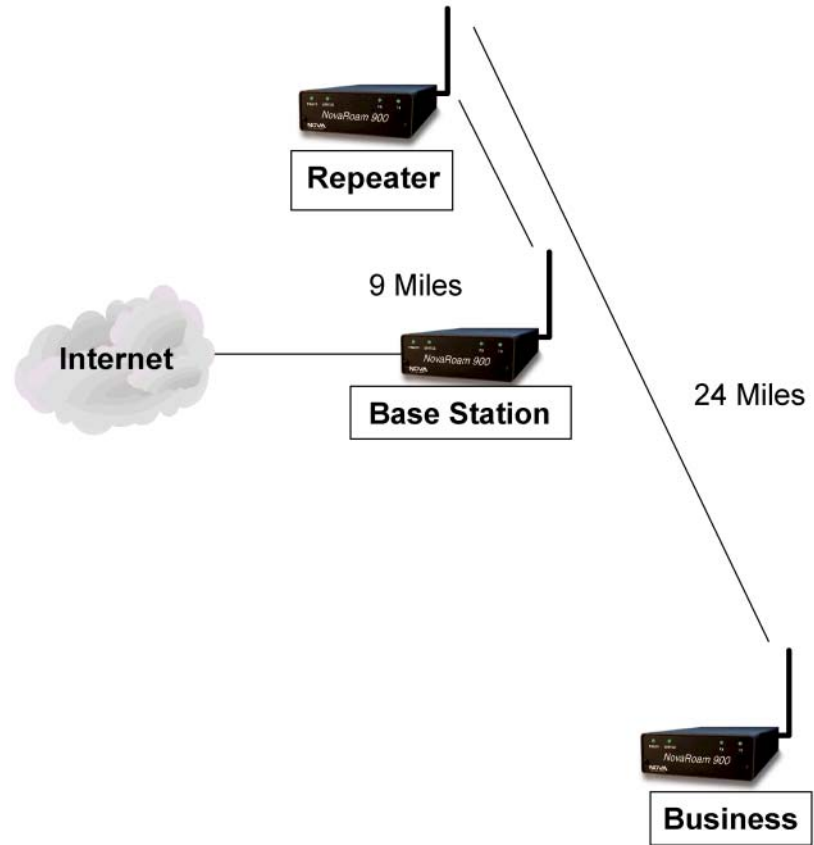
Three NovaRoam 900 Wireless Routers are involved in this link: one at the base station, one as a repeater node, and one at a business.

At the base station, a NovaRoam is connected to a 10/100 Mbps Ethernet switch that has been placed behind a Rebel Netwinder OfficeServer firewall. Full time Internet service is provided by Innovative Concepts using Wave Wireless equipment. The base station location is at an elevation of 320 feet.

A second NovaRoam is placed on Tassajera Peak, in San Luis Obispo, California, at an elevation of 2760 feet. This NovaRoam is configured to operate in repeater mode. The distance between the base station and the repeater is nine miles.

The third NovaRoam is located at the business that requires the high-speed Internet access. This NovaRoam is located 24 miles from the repeater.

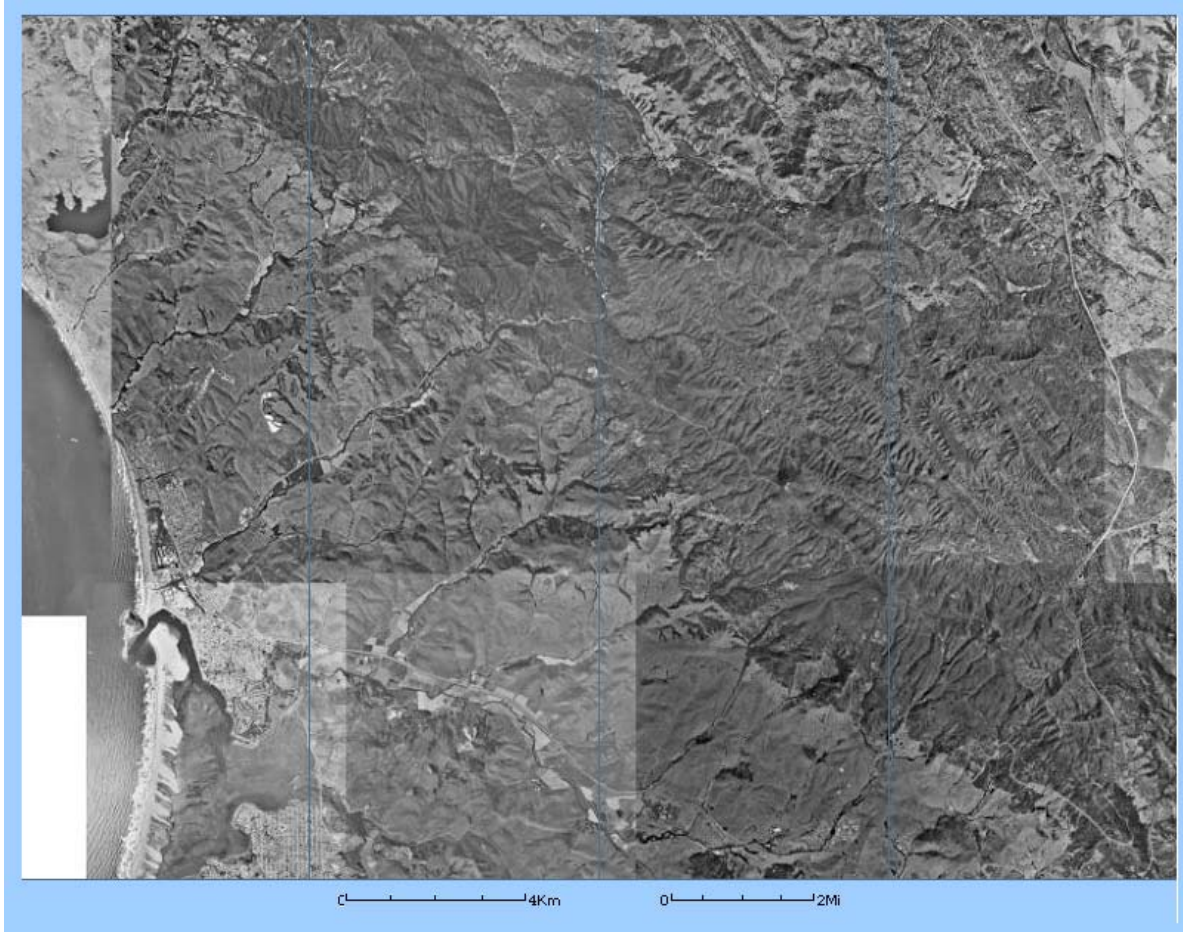
A Decibel DB498-K yagi antenna, which provides 9 dBd (11 dBi) of gain, is used as the antenna at each location.



**Figure 1: The positioning of the endpoints in relation to the repeater node**



**Figure 2: Area Terrain**



**Figure 3: Satellite Image of the Area**

## **Configuration**

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Each antenna is horizontally polarized in order to reduce interference from adjacent services such as paging. With this orientation, the Decibel DB498-K yagi antenna has a horizontal beamwidth of about 40 degrees. Due to the unequal path lengths, the repeater beam is aimed more toward the business rather than towards the middle of the included angle.



The wireless link is configured to provide a burst data rate of 159 kbps. Route entries have been entered into each NovaRoam so that they may route data to each other. The average latency from the base station to the business is 86 ms.

## Conclusion

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This NovaRoam 900 wireless network provides extremely reliable high-speed Internet access of a total link distance of 35 miles.