

Replacing 4-Wire Leased Lines with *Trailblazer*TM 4.9 GHz Point-to-Point Radio

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Introduction

The Carlson Wireless Technologies *Trailblazer* 4.9 GHz digital microwave radio may be deployed in Public Safety two-way radio networks to replace or back-up 4-wire leased telephone lines. In this application the *Trailblazer* is factory-configured with up to eight 4-wire analog interface circuits which allow direct connection to two-way radio base stations, voter receivers, trunked radios and any other equipment operating with a standard 4-wire or 4-wire E&M interface. **No channel bank is needed.**

Use of the *Trailblazer* improves network reliability and reduces downtime caused by cable failures. Use of the 4.9 GHz (4940 to 4990 MHz) licensed band, which is dedicated solely to public safety, eliminates interference from the general public.

The *Trailblazer* 4.9 GHz radio may be used to replace leased lines in tone-controlled radio systems. The leased lines must be 4-wire (transmit and receive on separate cable pairs). *Trailblazer* will not support DC controlled systems or systems using 2-wire (transmit and receive both on one cable pair) interfaces.

4.9 GHz Licensing

Any qualifying public safety agency may easily obtain a general 4.9 GHz license at no cost by submitting a form on the FCC ULS web site, <http://wireless.fcc.gov/uls/>. Permanent point-to-point links require site-specific licenses in addition to the general license. Site-specific licenses are obtained in the same way; but must have endpoint coordinates and certain other specifics of the link specified.

Advantages

Telephone company leased lines are subject to failures caused by natural disasters and man-made accidents. Falling trees, ice, snow and vehicle collisions may cause aerial cables to break. Buried cables can be damaged by construction work. Failed lines may take hours or days to be repaired, depending on telephone company workloads. Leased lines can easily be a weak link in mission-critical radio communications.

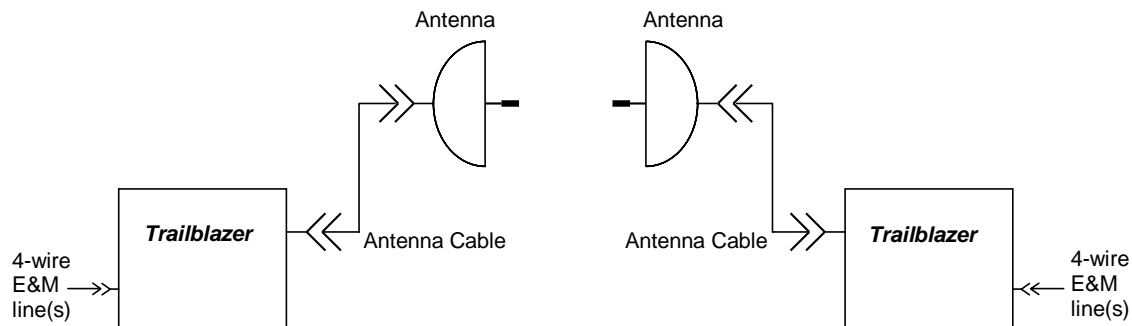
One method to reduce failures and improve two-way radio network reliability is to replace leased lines with *Trailblazer* microwave radio. Radio links are less likely to get damaged in natural disasters and highly unlikely to fail due to accidents. When lives are at stake, police and fire agencies depend on their two-way radio networks. *Trailblazer* helps ensure those networks are always operational.

Trailblazer Link Conditions and Distances

Maximum link distances, which may exceed 50 miles, are achieved under true line of sight (LOS) conditions where there is an unobstructed first Fresnel zone. True LOS usually requires installation on tower structures or building rooftops to gain necessary elevation. In applications where true LOS does not exist, a *Trailblazer* repeater may be added to transmit around an obstacle as long as there is LOS between the repeater and each end point.

Block Diagram

Components of a *Trailblazer* point-to-point link are interconnected as detailed below:



Each *Trailblazer* link is factory configured to carry one to eight 4-wire E&M lines. On systems configured with less than eight 4-wire lines, the extra interfaces may be configured to support a standard 2-wire telephone line or Ethernet data interface.

Trailblazer Equipment List

A *Trailblazer* leased line point-to-point link requires quantity (2), P/N TB-LL, Trailblazer Base/Terminal Unit, each unit equipped with:

1	512-7049	4.9 GHz radio card
1 to 8	TB-EM	4-wire E&M line interface

Antennas

Carlson Wireless Technologies recommends using either 2 foot or 4 foot diameter parabolic dish or grid antennas with *Trailblazer* systems. A *Trailblazer* link using a pair of 2 foot antennas should transmit up to 10 miles. A pair of 3 foot antennas will increase the operating distance up to 20 miles. Actual distances are determined by performing a detailed path analysis which includes such factors as antenna gain, antenna cable length and type, LOS conditions and fade margins. Carlson Wireless offers the following 4.9 GHz antennas:

050-4927	2 foot diameter parabolic dish, 27 dBi gain
050-4931	3 foot diameter parabolic dish, 31 dBi gain

Carlson Wireless highly recommends using ready-made antenna cables. These are N-male to N-male cables used to connect the antennas to Base Units. Two antenna

cables are required per link. Cable lengths are determined by site specific requirements and are offered in the following standard lengths:

160-2120	20 foot
160-2130	30 foot
160-2140	40 foot

Carlson Wireless can also supply cables to customer specified lengths.

Other Equipment

Trailblazer equipment operates on 12-24 VDC power. The following optional power packages are available:

640-7700	AC Power Supply with Battery Back-up
640-7705	AC Power Supply without Battery Back-up

Solar power packages are also available, contact Carlson Wireless for details.

Trailblazer enclosures can be mounted directly to a wall or backboard. For pole or mast mounting P/N 900-7200 Pole Mount Assembly must be ordered.

A 4.9 GHz lightning suppressor installed between the antenna and *Trailblazer* enclosure is highly recommended. Carlson Wireless offers Lightning Suppressor P/N 640-6549 for this purpose.