

Providing Connectivity to Railways' own Remote Ticket Booking Sites

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Solutions for extending connectivity at Railway's Remote Ticket Booking sites

A. Providing connectivity to RS232 Terminals using advanced Statistical Multiplexers without extending IP

Cygnus pioneered the development of Statistical Multiplexers, Data Compression Multiplexers and Voice-Data Multiplexers for Railway ticketing applications. Over a period of 20 years more than 10,000 Cygnus multiplexers were deployed in these applications.

CYGNUS 711 Next Generation Multiplexers are the latest addition to the CYGNUS range of multiplexers. Designed for today's requirements, these multiplexers leverage Cygnus' in-depth knowledge of Railways' applications in order to add several new features, such as:

- ◆ Higher Terminal Port speeds of up to 115.2 kbps as against 19.2 kbps for older muxes
- ◆ Higher Network Port speeds of up to 2 Mbps as against 64 kbps for older muxes (Note: increasingly, service providers are providing only 2 Mbps links and not 64 kbps)
- ◆ Provision of optional standby link to provide continued connectivity on failure of a line
- ◆ Cost-effective network strategies especially when a number of booking sites with small number of RS232 terminals need to be connected to the same upstream site
- ◆ 1500 VAC isolation on RS232 ports to minimize port failure owing to faulty supply wiring or high voltage surges.
- ◆ Peer-to-peer port operation for optimized port usage
- ◆ Available in a range of Terminal port (4, 8 and 16) and Network port (1, 2 or 4) capacities

Fig. 1 shows two 4-port CYGNUS 711 units connected using a 64 kbps/2 Mbps link. An optional standby link can also be provided, to which traffic automatically shifts if the first link fails.

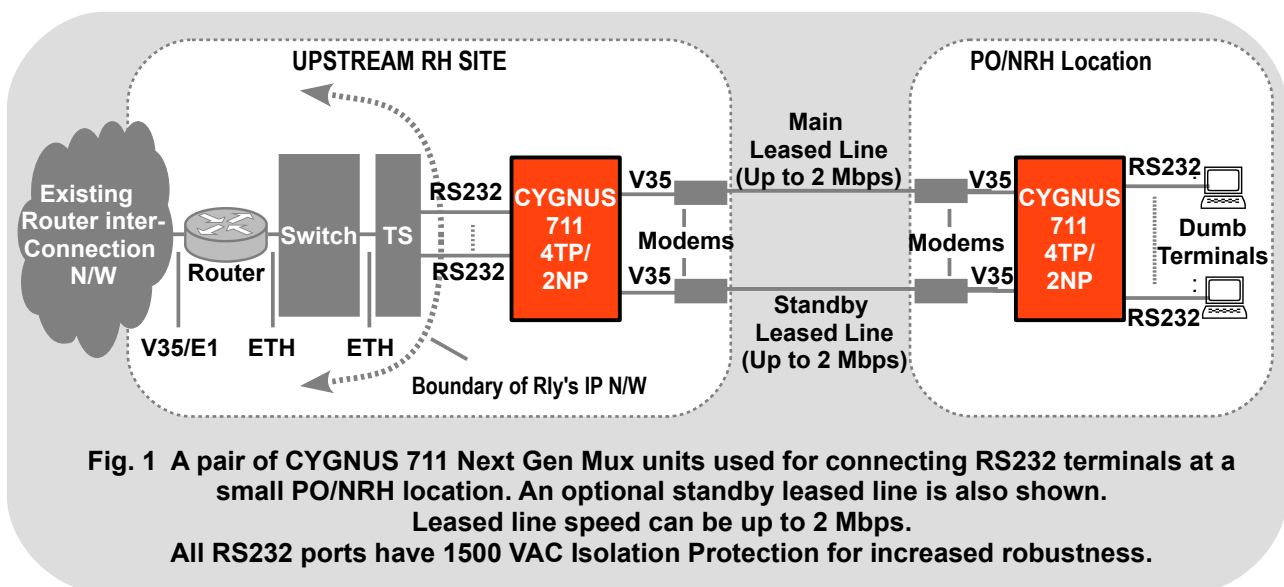
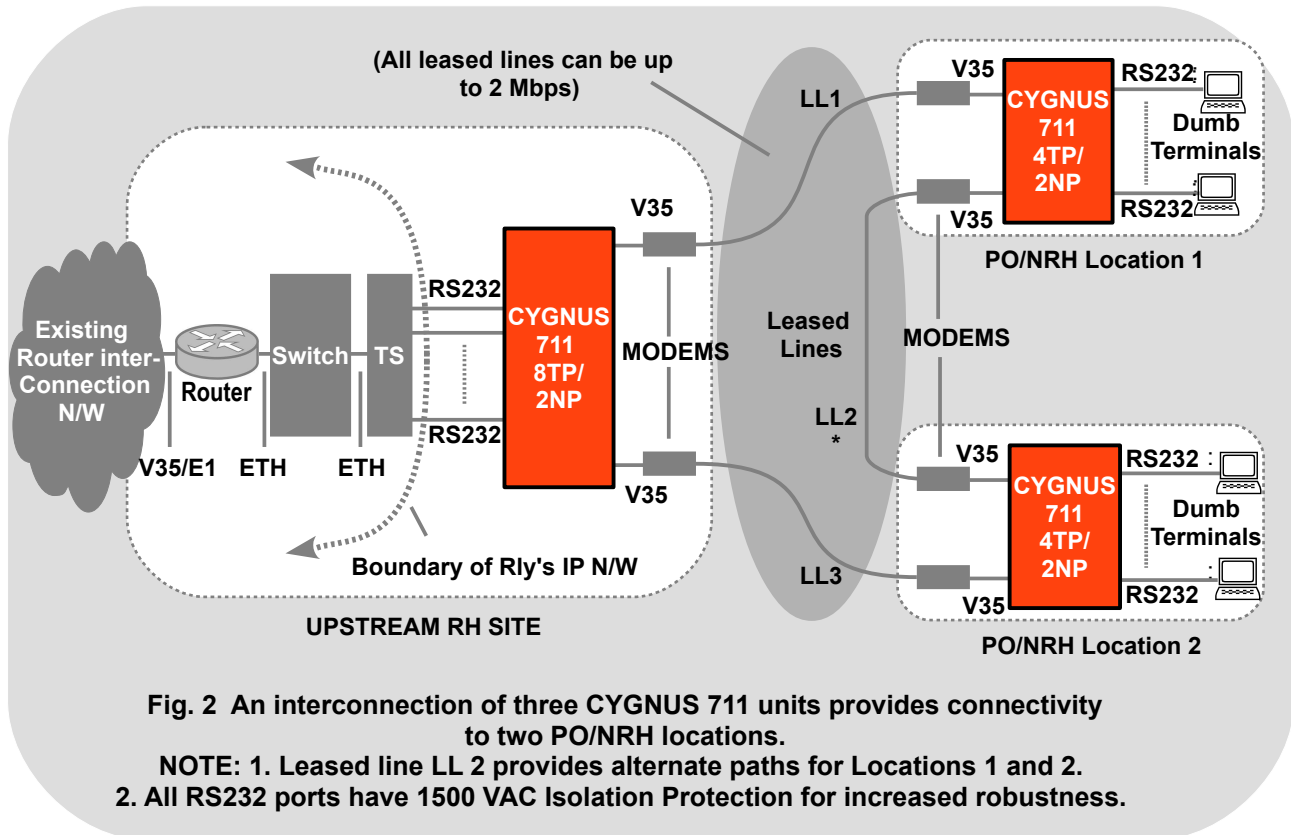


Fig. 2 illustrates some more capabilities of CYGNUS 711. It shows a 8TP/2NP CYGNUS 711 unit at an upstream site which is connected to two different remote booking offices, each having a 4TP/2NP unit. Each booking office has a leased line to the central site (LL1 and LL2), and there is an optional standby link between the two remote booking offices.

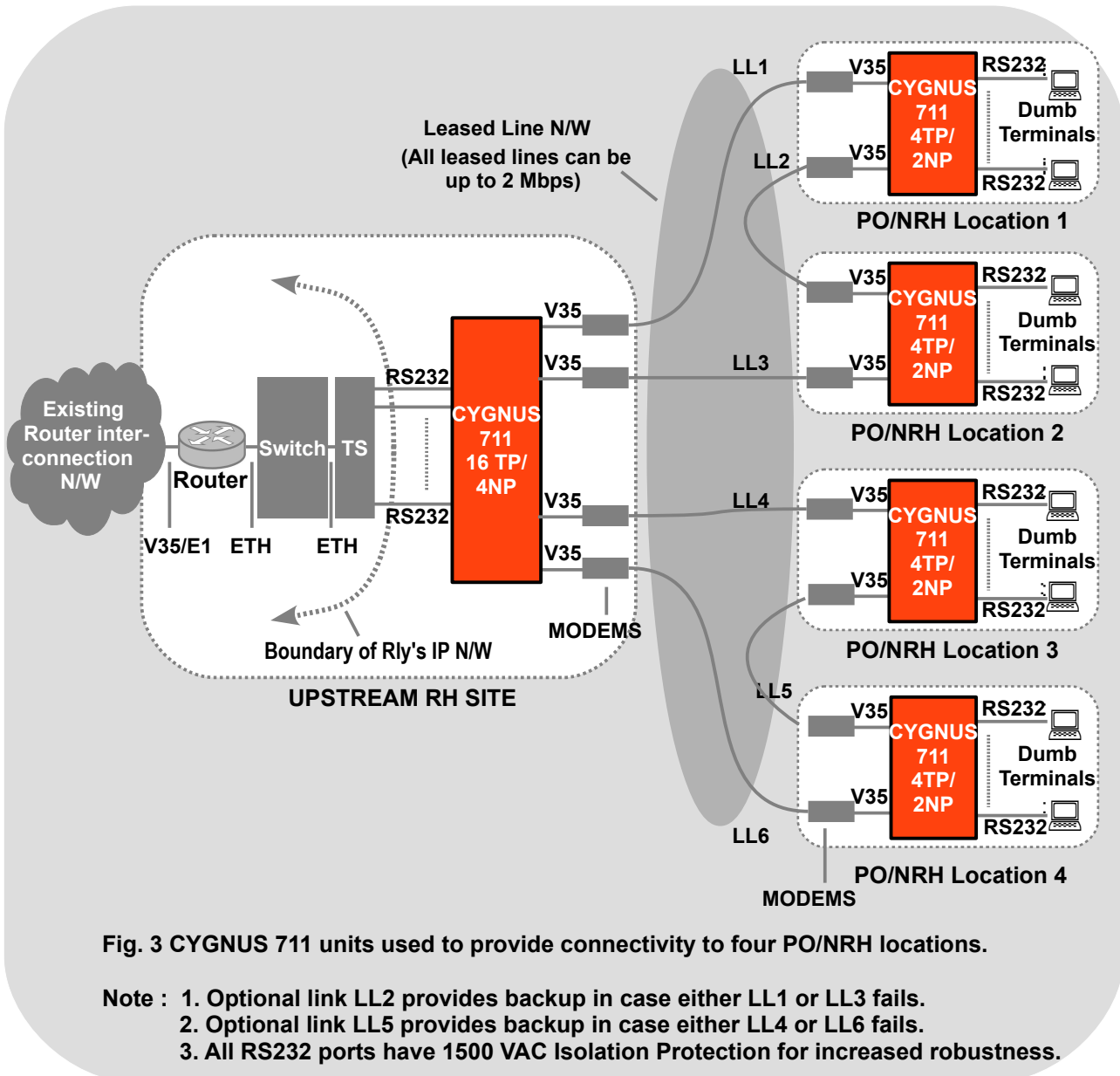


This application shows that:

- ◆ CYGNUS 711 units with different number of Terminal Ports can be linked to each other. In the diagram the central unit has 8 ports while the booking office units have 4 ports
- ◆ Terminal Ports of the same CYGNUS 711 unit at an upstream site can be mapped to terminals at several different remote locations. This reduces the number of CYGNUS 711 units required at the central site - which reduces costs, the space required to house the units, and interconnecting cabling. To connect two booking offices to the same upstream site with ordinary muxes would have required 2 units at the central site instead of the single CYGNUS 711 unit shown in Fig. 2.2.
- ◆ The standby link need not always be between the booking office and the upstream site - it can even be between two booking offices themselves. If either LL1 or LL2 fails, traffic from that booking office automatically reaches the designated ports of the central unit via the standby link and the Cygnus 711 at the other booking office. This reduces the total number of links required to provide standby connectivity.

Fig. 3 illustrates the versatility of CYGNUS 711 further. Here the upstream site has a 16 port CYGNUS 711 unit with four Network Ports. To each of its Network Ports a 4TP/2NP CYGNUS 711 unit at a location is connected via leased lines. The ports of a single upstream unit are thus mapped to terminals at four different locations. With ordinary muxes this would have required 8 muxes, with 4 of them being located at the upstream site itself. In comparison, the solution shown is cost-effective and the upstream site setup is also much less complex.

If required, leased lines may be provided between Locations 1 and 2, or between Locations 3 and 4, in order to provide path redundancy to those sites.



B. Providing connectivity to RS232 Terminals and Ethernet Devices using single leased line

CYGNUS 843RE Bridging Terminal Server takes the concept of connecting remote RS232 and Ethernet user devices using Terminal Servers, to the next step - i.e., where the remote booking office is at a different location altogether and is reached from an upstream site over a leased line. This is an urgent need, since small booking offices with a few counters are increasingly being set up at Post Office/Non Railway Head (PO/NRH) locations, defence sites, state government offices and other important locations, and also at City Booking Offices (CBOs).

Traditional solutions for such locations use a Terminal Server (TS) for RS232 devices and a Switch for Ethernet devices. These devices are connected to a Router, which accesses the core network via leased lines. This solution is complex and expensive. Also, since most NRH locations connect to the network via only one leased line, a Router doesn't add any value as there are no alternate routes which it can discover and utilise in case a link fails.

CYGNUS 843 offers a simple, cost-effective alternative to connect such locations. Ethernet/RS232 user devices at the booking office use the CYGNUS 843 there as just a Terminal Server. The difference between CYGNUS 843 and standard Terminal Servers (like CYGNUS 1021) is that while standard Terminal Servers connect to the core TCP/IP network locally via an Ethernet port, CYGNUS 843RE can access the core network even via an upstream site which it reaches over a leased line (64 kbps to 2 Mbps). V.35 ports are provided on CYGNUS 843RE for connecting to external leased line modems.

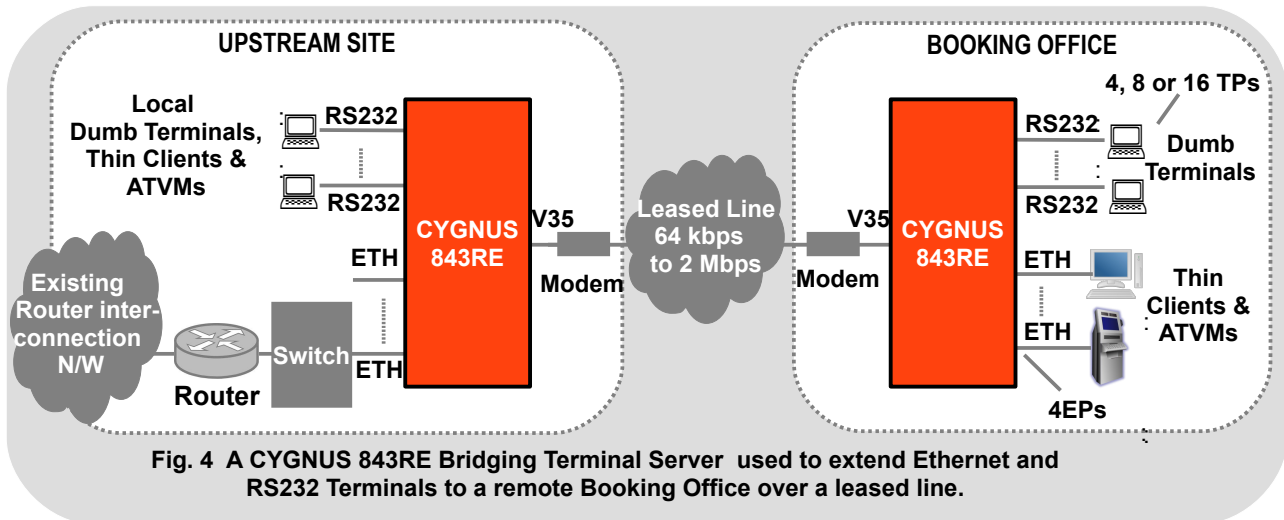


Fig. 4 A CYGNUS 843RE Bridging Terminal Server used to extend Ethernet and RS232 Terminals to a remote Booking Office over a leased line.

Fig. 4 illustrates how CYGNUS 843RE is used. A CYGNUS 843RE unit at the booking office is connected to another CYGNUS 843RE unit at the upstream site using a leased line and modems. The upstream unit, in turn, connects to the network through an Ethernet port there. Features of this solution include:

- ◆ CYGNUS 843RE units automatically detect and correct any errors that occur during transmission on the leased line.
- ◆ RS232 ports of the upstream unit, and its remaining Ethernet ports, can be used to connect user devices there
- ◆ RS232 ports of CYGNUS 843RE provide 1500 VAC isolation protection, making them robust.
- ◆ Unused Ethernet ports can be disabled to enhance security. It is also possible to configure CYGNUS 843RE units to allow access only to Ethernet devices with specified MAC addresses

CYGNUS 843RE is available with 4 Ethernet ports and 4, 8 or 16 RS232 Terminal Ports.

Fig. 5 shows another solution. Here the upstream device is not CYGNUS 843RE, but CYGNUS 842 Ethernet Bridge. This is probably the most cost-effective solution for connecting Dumb Terminals and Ethernet devices at a remote booking office over a leased line.

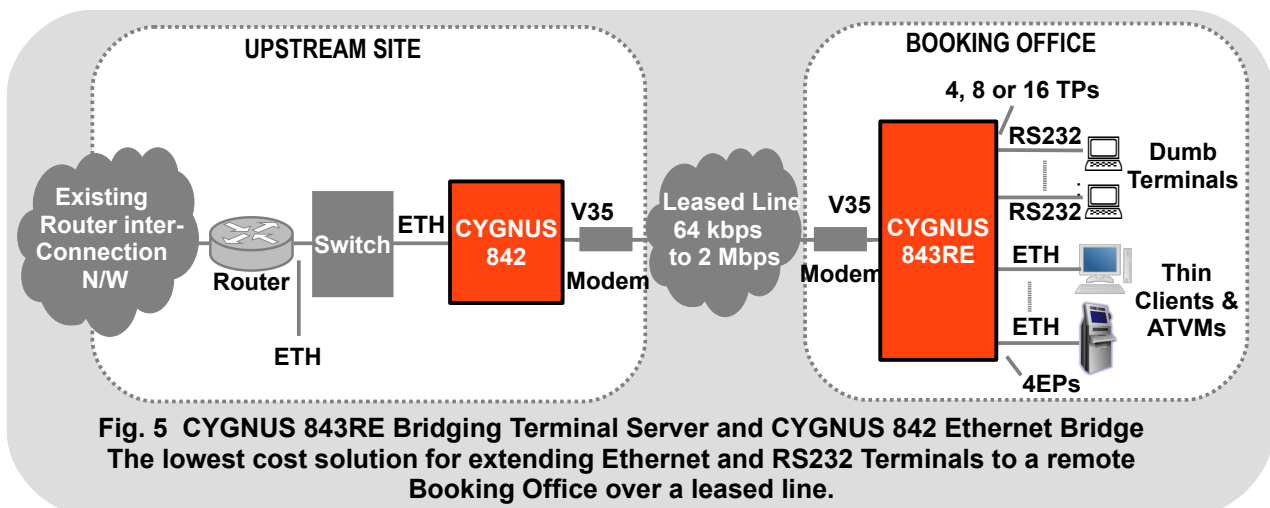


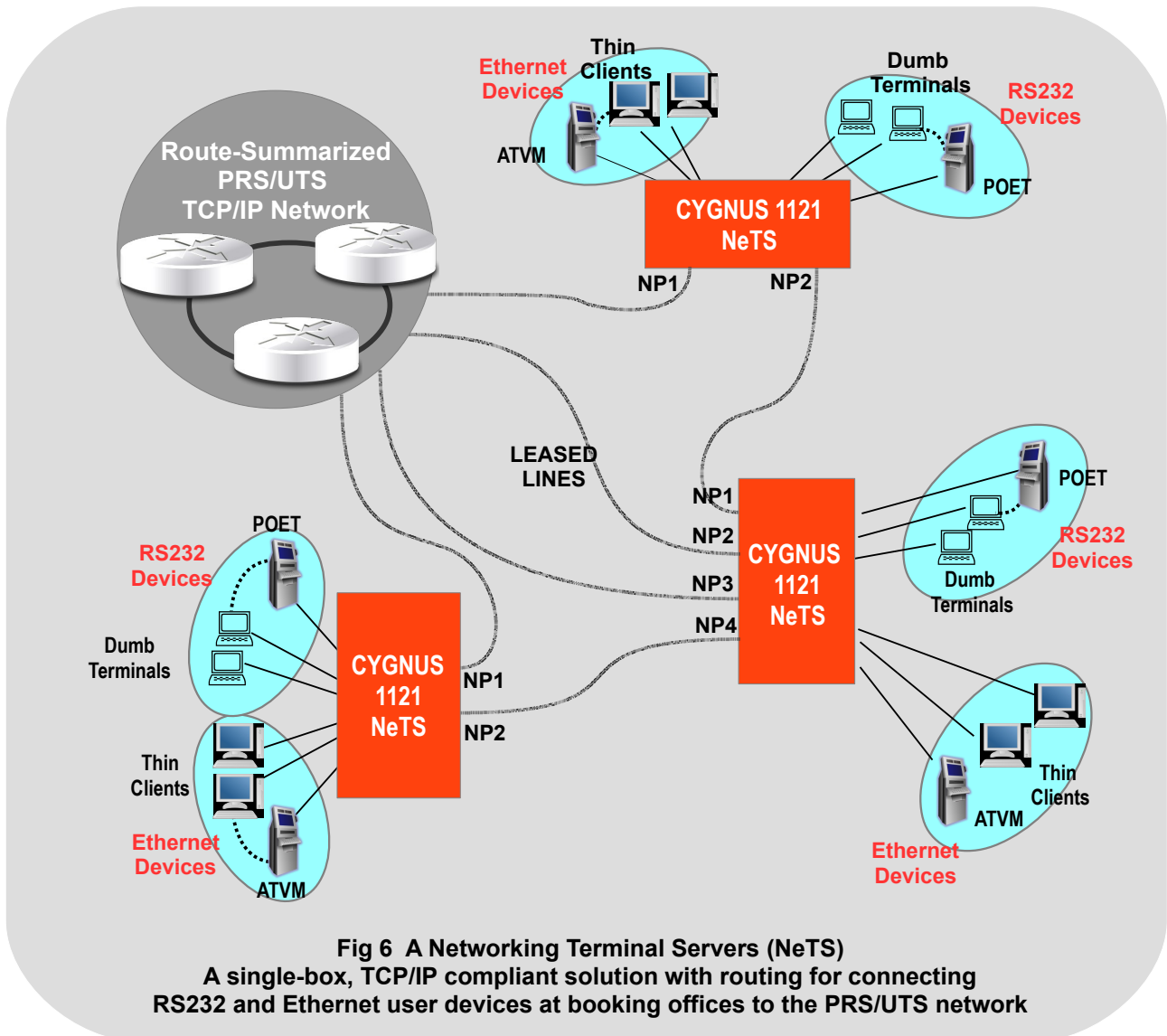
Fig. 5 CYGNUS 843RE Bridging Terminal Server and CYGNUS 842 Ethernet Bridge The lowest cost solution for extending Ethernet and RS232 Terminals to a remote Booking Office over a leased line.

C. Providing Connectivity to RS232 Terminal and Ethernet Devices using IP Networking

Advancing another step, CYGNUS 1121 Networking Terminal Server (NeTS) adds Routing to the Switched Terminal Server in order to extend the theme of simple, cost-effective, single-box solution for connecting both RS232 and Ethernet user devices at remote booking offices. By integrating the functions of a multi-WAN router, a Terminal Server and a LAN Switch in one box, NeTS brings ultimate integration and convenience.

Fig. 6 shows a network of interconnected CYGNUS 1121 NeTS. RS232 devices (dumb terminals, POET) and Ethernet devices (Thin Clients, ATVMs) are connected to NeTS.

The key benefit of Routing is that it allows the units to automatically discover alternate paths (if they exist) in case a leased line or an intermediate Router fails. NeTS and NAX are TCP/IP compliant and offer the option of using OSPF (Open Shortest Path First) protocol to seamlessly co-exist with other standard routers in a Route Summarized OSPF network (OSPF is a sophisticated routing protocol which allows quick rerouting of data on link failures).





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The cost of NeTS is only a fraction of the cost of the standard Router-Switch-Terminal Server combination. Also, due to high integration and reduced cabling, the solution is more reliable. Less space is required to house the equipment, and the requirement of spares is reduced. Due to their highly optimized design (to cut down ownership costs), NeTS expects that the TCP/IP network is configured hierarchically using OSPF Route Summarization, so that the OSPF protocol is used efficiently.

The CYGNUS 1121 NeTS may be ordered with eight or sixteen RS232 Terminal Ports, four or eight 10/100 Mbps Ethernet ports and two or four V.35 Network Ports capable of operating at speeds from 64 kbps to 2 Mbps. Two of the Network Ports can even be ordered with E1 or 64 kbps co-directional (COD) G.703 interface in lieu of V.35.

NeTS provides value for money and simplify the setup. It is ideal for connecting booking offices at smaller Rail Head and Non Rail Head locations, such as those at Class “D” and Class “E” stations.

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