

Providing Connectivity for TCAS Equipment

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Interconnecting Ground Based Subsystems of Train Collision Avoidance System using G.SHDSL Copper Modems, Fiber Optic Modems, RS232 Port Extenders, E1 Converters over dedicated copper or optical fiber or Railways OFC Backbone accessed through Cable Huts

Cygnus's fiber optic and copper based modems can play a vital role in the establishment of a network that interconnects various components of Train Collision Avoidance System (TCAS). The connectivity required in this application includes: extension of RS232 ports, and interconnection of LANs between two stations or between a station and an intermediate point. While use of direct optical fiber is recommended to avoid vulnerabilities of copper circuits to electromagnetic interference, copper can be used over smaller distances. If distances are large, use of Railways E1 network can also be considered by running the equipment connections to a nearby E1 network access point - typically a cable hut.

Following are some connectivity requirement in TCAS that can be met through CYGNUS products.

A. Extending multi-signal RS232 ports of radio modem using Direct Fiber

The CYGNUS 883 Multi-signal Fiber Optic Modem carries a number of RS232 port signals from Radio room (where the radio transmitter equipment for providing Railway engine-to-ground equipment connectivity is located) and Station TCAS equipment which is located at Railway Station Premises. Fig 1 shows how the radio modem equipment is connected using CYGNUS 883. The CYGNUS 883 carries a large number of RS232 interface signals end-to-end with low latency to provide transparent operation between Station equipment and Radio equipment. An option of additional hot standby fiber is also available to provide a redundant communication path between the equipment.

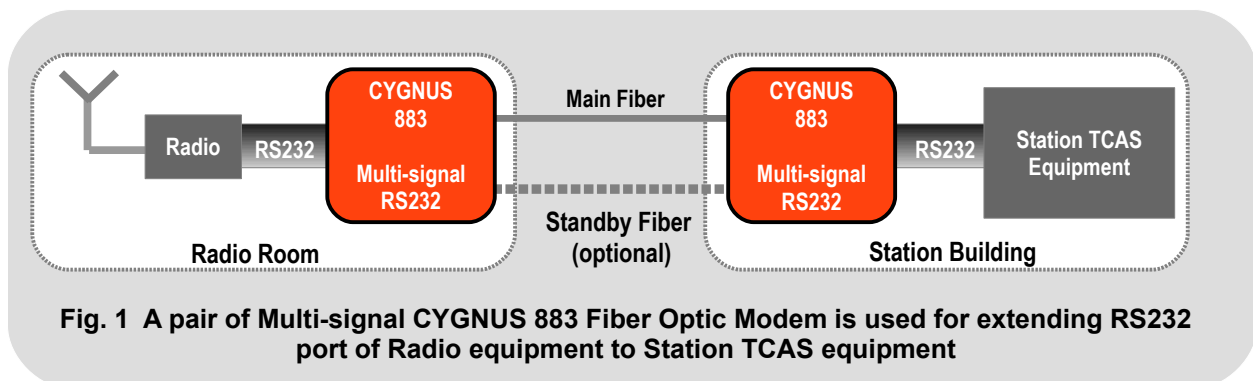
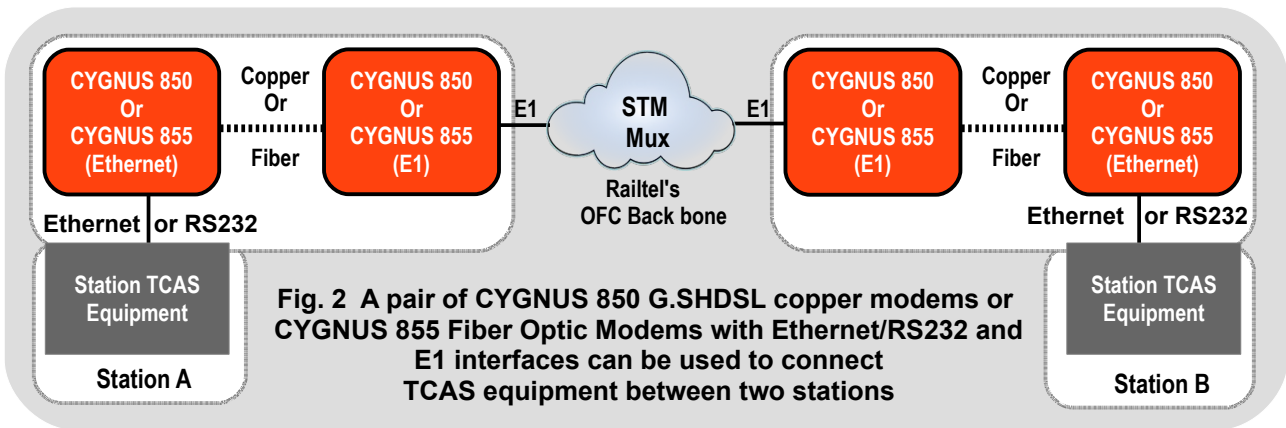


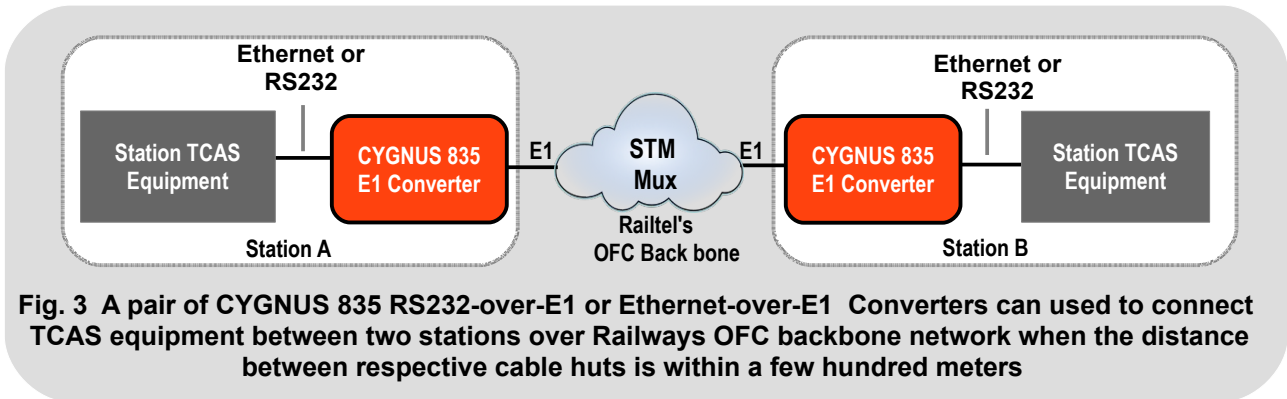
Fig. 1 A pair of Multi-signal CYGNUS 883 Fiber Optic Modem is used for extending RS232 port of Radio equipment to Station TCAS equipment

B. Interconnecting Ethernet/RS232 based Station TCAS equipment over E1 links using copper or optical fiber in the local lead

TCAS station units at a station also require connectivity to onward stations. This is provided through E1 circuits available at the cable hut. To access the E1 port at the cable hut, the RS232/Ethernet interface of the station TCAS equipment needs to be extended to the cable hut, and converted to E1 format. This arrangement is shown in Fig 2. It uses a pair of CYGNUS 850 G.shdsl modems or CYGNUS 855 Fiber Optic Modems - one at the station TCAS and the other at the cable hut. The modem at the station has a RS232 or Ethernet interface, as required, to connect to the TCAS equipment. The modem at the cable hut has an E1 interface to connect to the STM equipment there.

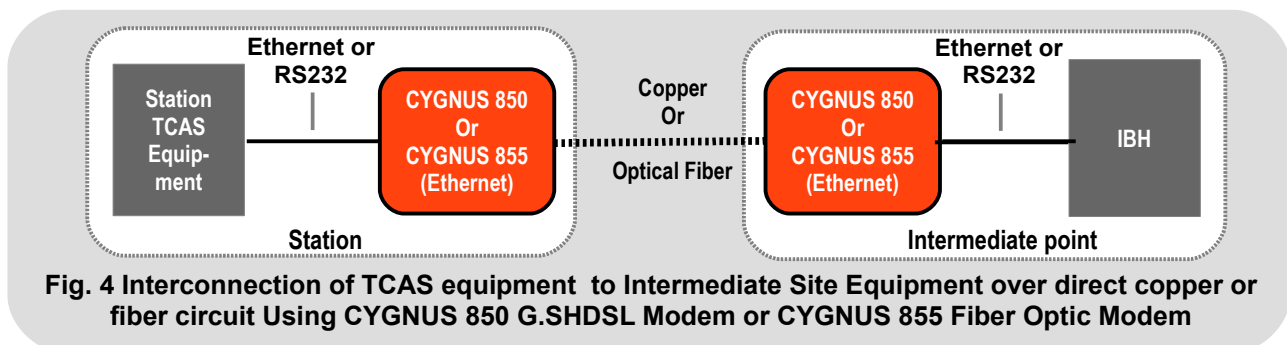


In case the distance between the TCAS equipment and cable hut is less than a few hundred meters, instead of a modem a converter which maps Ethernet or RS232 signals directly to E1 may be used, and the E1 signal may be carried to the Cable hut over short copper cable. This arrangement is shown in Fig 3. This arrangement may be used on any side of the TCAS equipment as shown in Fig 2. However long copper circuit between the converter and Cable hut should be avoided as it is prone to electrical disturbance.



C. Interconnecting Ethernet/RS232 based Station TCAS equipment over copper or Fiber Links

If two station TCAS equipment that need to be interconnected are close to each other the RS232 or ethernet connection may be achieved by directly connecting a pair of CYGNUS 850 G.SHDSL Modems or CYGNUS 855 Fiber Optic modems with the appropriate DTE interface. This set up is shown in Fig 4



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