



Application Note – Testing & Troubleshooting HVDL

Application

This application note describes techniques for testing and troubleshooting HVDL systems.

HVDL Basics

The HVDL system uses standards based G.SHDSL to transport high-speed data and POTS service to customers located outside the range of other high-speed data technologies, such as ADSL. An HVDL system consists of a Central Office Terminal (COT), a Remote Terminal (RT) and if needed, up to 3 repeaters. Figure 1 shows two HVDL installations – one with a repeater, and one without.

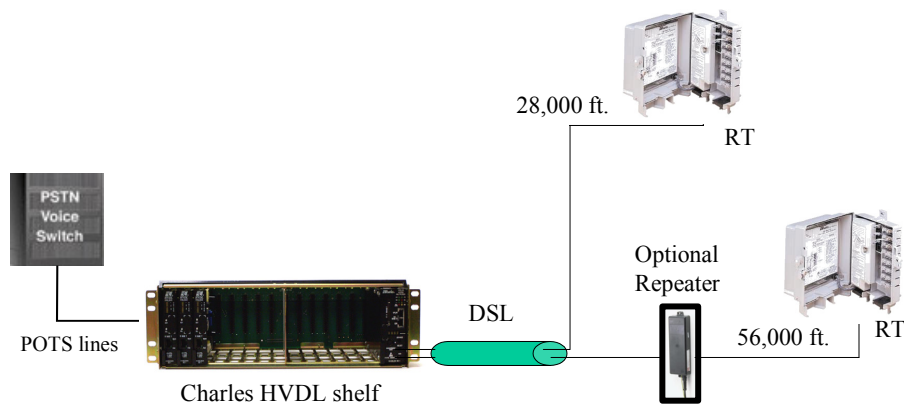


Figure 1 –HVDL systems

Testing HVDL systems

How can HVDL systems be tested? Is there a test set on the market that can be used for troubleshooting HVDL systems? What about test sets that support G.SHDSL? How can I qualify cable runs prior to installing an HVDL system?



Loop Pre-qualification

Loop pre-qualification should begin with the same basic techniques used to test cable pairs for standard POTS operation. The cable pairs should be tested for opens, shorts, grounds, AC noise, and longitudinal balance. Any faults with the cable pairs should be repaired before installing HVDL. In addition to these tests, the cable pair must also have all load coils removed. There are many test sets available for testing these parameters on cable pairs.

In addition to the tests just described, any test set that can generate or receive G.SHDSL-type signals at rates up to 1 Mbps should be adequate for pre-qualifying cables runs for HVDL. Such test sets can often generate G.SHDSL-type traffic to verify how well the cable pair will pass G.SHDSL frequencies. Figure 2 illustrates such a test using G.SHDSL test sets.



Figure 2 – Loop pre-qualification (illustration from [Sunrise Telecom](#))

HVDL Troubleshooting...

Although HVDL is a G.SHDSL system, neither the COT nor the RT will train with a G.SHDSL test set. The COT and RT have been designed to train and communicate with one another or with an HVDL repeater.

Therefore, the best way to troubleshoot HVDL systems is to use known good HVDL components.

...in the Central Office (C.O.)

Testing the HVDL system in the C.O. provides an easy way to isolate any malfunctioning components. In the C.O., connect the RT (and repeaters, if any) to the COT right at the MDF (Main Distribution Frame), as shown in Figure 3. Having all the HVDL components (COT, repeaters, and RT) in the C.O. allows the technician to see the COT and RT, and to see if the HVDL system will successfully train. This scenario also eliminates any cable-related trouble such as shorts, opens, grounds, excessive noise, poorly balanced pairs, and load coils. ***The HVDL system does not need long lengths of cable between the COT and RT in order to work. The COT and RT will train with as little as a few feet of cable between them.***

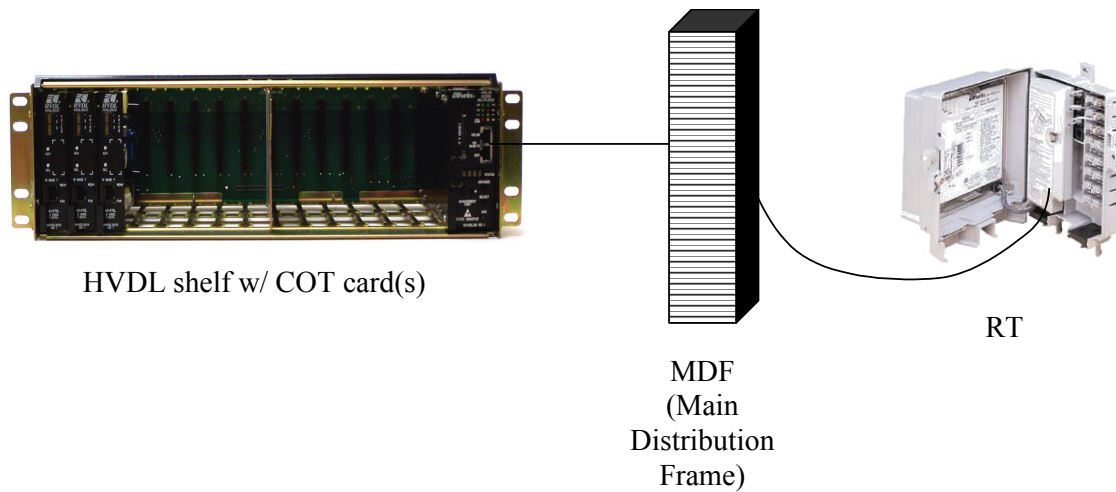


Figure 3 – HVDL troubleshooting in the C.O.

...at Repeater locations

To troubleshoot a suspect repeater, place a known good RT on the field side of the repeater. Figure 4 shows COTs installed in the C.O., and a repeater installed in the field. In order to test the COT, the DSL line, and the repeater, the RT is connected to the field side of the repeater with a short length of twisted-pair cable. The HVDL system trains sequentially--first, the link between the COT and the repeater, and then the link between the repeater and the RT. If the HVDL system does not successfully train, then move the RT to the C.O. side of the repeater as shown in Figure 5.

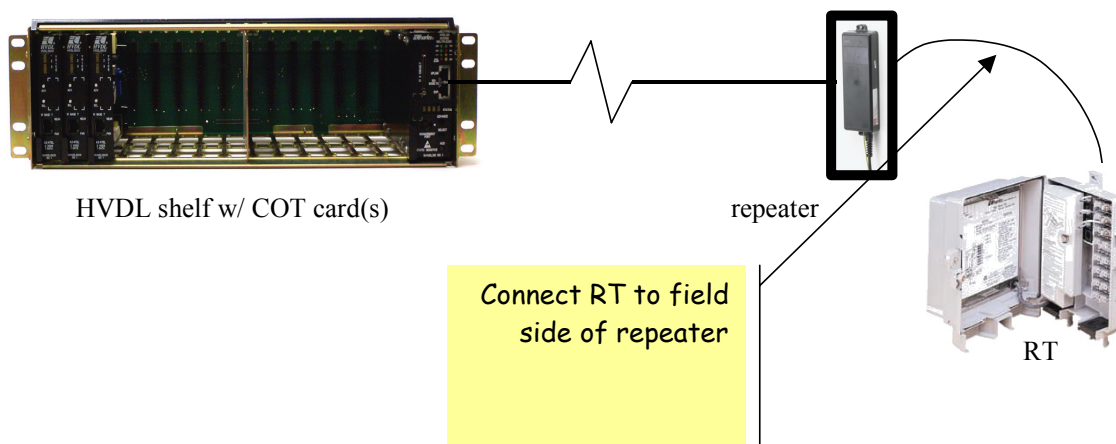


Figure 4 - RT on the field side of a repeater

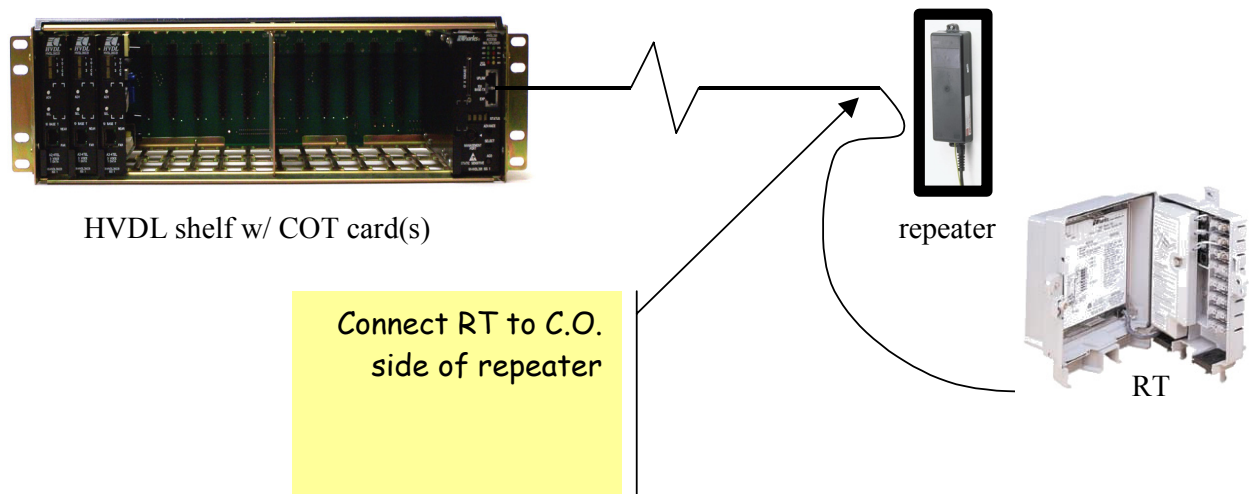


Figure 5– RT on the C.O. side of a repeater

Figure 5 shows an RT installed on the C.O. side of a repeater. The repeater has been removed from the DSL line. The COT and RT can now train directly with one another, which will verify that the COT and RT are working, and that the DSL line from the C.O. to this location is good as well. If the system does not train, and the COT and RT are both known to be good, then there may be a problem on the cable pair, such as a load coil that was not previously removed.

Further Information:

Further information on Charles Industries products may be found at:
<http://www.charlesindustries.com>

For further information on testing and troubleshooting HVDL, please contact:

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