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Installing G.fast in a Residential Neighborhood

In a previous tech tip, we discussed the best methods to install G.fast, referred to as G.fast, in multi-dwelling units. For this tech tip, we'll look at single family homes. Installing G.fast in a residential neighborhood is slightly different in that the Distribution Point Unit (DPU) will be outside in the elements making it more susceptible to faults. As a result, testing for faults will be critical. Below is a list of five testing steps to follow to make installing G.fast into a residential neighborhood a success.

1) **Check the DPU**: The DPU is similar in functionality to a traditional Digital Subscriber Line Access Multiplexer (DSLAM), and residential units will range from eight to 16 ports or more depending on the population density and outside plant architecture. The DPU has most likely been installed somewhere outside the customer premise, usually in a street cabinet or on a telephone pole servicing the neighborhood. Due to the more limited range of G.fast compared to older xDSL technologies, street cabinets may be too far from the customer premise. In such cases, an environmentally hardened DPU that receives back power from the customer premise may be used. It should be situated where both copper plant to the customer premise and backhaul connectivity to the core exists such as a pedestal location. This is type of deployment is referred to as fiber to the DP.

   For newly installed DPUs, test the incoming optical power levels, inspect the fiber optic connector, clean as necessary and connect to the DPU. Verify the DPU is properly powered and indicates a successful connection to the optical backhaul network. For a fiber to the DP deployment, verify the back power from the premise is providing power as needed.

   Each home will get connected through a specific port in the solution enclosure or directly through the DPU. Validate the DPU is functioning properly and all wiring is operational by testing for G.fast sync on each active port. This is achieved by connecting directly to the test jacks or wire pairs in the solution enclosure or on the DPU and verifying they are able to achieve G.fast sync. It is not uncommon to find bad connections or defective splitters during this process. It is also recommended that each subscriber port to be activated is tested to validate it meets the minimum offered rates each customer signed up for with their service.

2) **Check the Outside Wiring:** Physical faults in the outside plant will impact the service experience. The fact that the DPU is outside makes this step critical since there is more opportunity for faults due to environmental elements and the copper plant. The connection between the DPU and the Customer Premise Equipment (CPE) will be copper twisted pair. Test for conditions such as shorts or opens, impulse noise and proper longitudinal balance. Also test to make sure the loop length between the DPU and CPE is less than 500 meters.

3) **Check G.fast Sync at the Home:** G.fast sync has been tested at the DPU and the copper plant to the home has been validated, however, it is still important to test the G.fast sync and performance again, but this time at the Customer Premise Equipment (CPE) location. It is recommended to perform a OneCheck DSL test to validate the actual rate, max rate, capacity and margin as well as identify any CRC errors, FEC errors or sync losses. If the sync does not work properly or the service does not achieve the expected performance, test the copper infrastructure to the DPU and the connections to the DPU again to identify the location of the problem. Once the sync is good and the expected performance is achieved, install the CPE.

4) **Check the Wireline Speed:** Once the CPE is installed, verify the delivered speed by running a wired speed test behind the CPE. It is recommended to perform a layer 4 TrueSpeed test like RFC 6349. This will validate the achievable bandwidth behind the CPE. If the achieved rate does not meet performance standards, it is possible the CPE is dropping packets or there are bit errors in the G.fast or backhaul connections that are causing packet loss and layer 4 retransmissions.

5) **Check the Wi-Fi Performance:** Once the wireline speeds are verified as good, the final step in an installation is to verify the Wi-Fi performance in the residence. Due to the open, dynamic and uncontrolled nature of RF environments, it is important to properly configure and deploy a Wi-Fi network. Many customer support calls are due to Wi-Fi issues. If a customer complains about slow speeds after an install, it's usually related to an issue with Wi-Fi.

Test the signal strength at key points in the residence to make sure it is strong. Pay particular attention to areas like wireless set top box locations, offices and gaming consoles. Make sure there is no noise interference from other customer premise locations and the selected channel isn't too congested. Ensure low channel utilization so the customer can receive the speeds they are paying for with G.fast.

Video camera systems and 2.4Ghz cordless phones can create interference on 2.4Ghz Wi-Fi networks. Consider using less crowded 5Ghz channels vs. the more popular and congested 2.4Ghz channels. It is again suggested to perform a quick RFC 6349 test over the Wi-Fi network to baseline the achievable Wi-Fi performance vs. the wireline performance.

For more information on deploying GTTH services, read [Strategies for Deploying Gigabit Broadband to the Home](#).

Products Used for Testing:
[OneExpert DSL](#)