

## Installing G.fast in a Multi-Dwelling Unit

Deployments using the ITU-T G.fast standard, referred to as G.fast, are gaining momentum in certain areas of the world. Customer expectations are high and it's important that this premium service is properly tested and turned up reliably to meet performance expectations.

G.fast services are typically delivered to a Distribution Point Unit (DPU) via passive optical network technologies or metro Ethernet services through a fiber optic connection. These fiber-to-the-distribution point (FTTdp) environments are ideally suited for G.fast's serving capability, which is typically limited to within 400 meters. To help the install go as smooth as possible, Viavi has created a list of five steps to follow when installing G.fast into MDU and Multi-Tenant Unit (MTU) environments.

1. **Check the DPU:** The DPU is similar in functionality to a traditional Digital Subscriber Line Access Multiplexer (DSLAM), and will range from eight to 32 ports, or, more depending on the size of the MDU environment. The DPU has most likely been installed within a utility closet on the ground floor or in the basement of the building. 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.

A DPU can interface with the infrastructure of the MDU via multiple methods including: RJ jacks, 75  $\Omega$  coax connectors, and standard Telco 50 pin connectors. It is typical for a DPU to use a standard 50 pin Telco connector to interface with a DPU Solution Enclosure that is specifically designed to provide elements such as punch down blocks, G.fast NID POTS splitters with RJ11 test jacks, primary protectors, G.fast 75  $\Omega$  coax baluns and coax or twisted pair cable distribution management. It is important to verify that the DPU and its interface connections are ready to provide services to the building.

Each unit 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 baluns in the solution enclosure, or on the DPU and verifying they can achieve G.fast sync. It is not uncommon to find a bad connections or defective baluns/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 Inside Wiring:** A multi-dwelling building will have one or more of the following: Coax cable, Cat 3 twisted pair or Cat 5/6 cables running to each unit. The physical status of this infrastructure is often unknown, and it is important to validate the cabling to the unit is capable of successfully carrying G.fast services. Physical faults in the MDU wiring will impact the service experience.

Test the wiring to the desired unit for common physical layer defects that can impact G.fast services. For 75  $\Omega$  coax cable, test for shielding impairments and ensure there are no unnecessary splitters or impedance mismatches. It's common to find undocumented do-it-yourself modifications to the cabling where residents have added non-compliant splitters and coax runs to their units. For twisted pair, test for conditions such as shorts or opens, impulse noise and proper longitudinal balance. For a large MDU complex with centralized wiring, it is recommended to test the length of the run and verify it's within the 400m limit. Cat 5/6 twisted pair cabling should also be tested or checked for improper terminations which can cause cross talk.

- 3. Check G.fast Sync at the Unit:** G.fast sync has been tested in the wiring closet and the cabling to the unit has been validated, however, it is still important to 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, especially in close proximity situations like Multi-Tenant Buildings. 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. This is a common problem in a multi-dwelling building. 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](#)