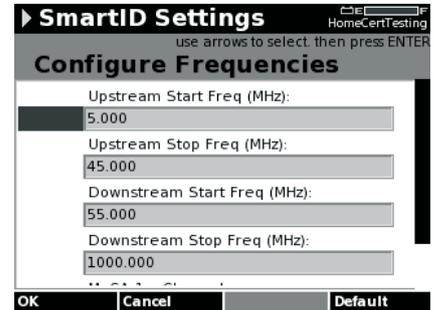


SmartID™ Service Plans and Limits Overview

How SmartID Works¹

SmartID measures sweep and frequency-domain reflectometry (FDR) ranges between 5 to 1,500 MHz.

The probe transmits a sweep signal in 250 kHz increments through the upstream frequency range and 5 MHz increments through the downstream. Users can configure sweep frequency ranges directly on the Digital Services Analysis Meter (DSAM) or within the Test Productivity Pack (TPP). For testing in the MoCA® range, the probes transmit sweep points at each MoCA subcarrier frequency, approximately in 195 kHz steps, based on the MoCA channel selected. The probes transmit all sweep points at a flat 50 dBmV to ensure the receiving SmartID can measure even through highly attenuated networks. The sweep measurement data determines whether a particular coax path is adequate for services (pass), or if the network needs additional attention (fail).



Start/stop frequency bands define test frequencies and limits. This screenshot does not show MoCA channel selection.

After sweeping, the system performs an FDR measurement. The probes analyze compound standing waves in the frequency response caused by impedance mismatches in the transmission path. The test mode analyzes each reflected wave component from downstream impedance matches to determine the distance and severity of each mismatch. Even good quality network components do not have a perfect impedance match, and based on commonality of distance and path loss detected in the sweep mode to and from each probe, the DSAM can surmise the location of splitters and various coax elements in the network. Most coax elements are near 75 ohm impedance and elements not designed to be in a 75 ohm network are likely to have an incorrect match, as will low quality components, and as such, can be identified, located, and shown to the user as well.

The limits set in each service plan define the pass/fail criteria for the measurements made between all connected SmartIDs. The user selects a service plan prior to the performance of a SmartID test. The DSAM comes with three default service plans (listed below). A supervisor can easily modify the DSAM's default limits for each service plan using TPP and push the modified plan to any DSAM unit in the field.

Service Plans

The DSAM has three default SmartID service plans:

- Drop Check
- Voice Video Data
- Voice Video Data MoCA

Each service plan has different limits based on a frequency band.

There are three frequency bands broken down in the SmartID mode: upstream, downstream, and MoCA. Each frequency band has its applicable limits which consist of:



A supervisor can edit, add to, or delete service plans from any DSAM using TPP and can push them to any or all DSAMs.

¹ SmartID probes are compatible only with DSAM-XT hardware with firmware version 4.0 or higher.

- **Maximum peak to valley** — Maximum variation limit between the highest and lowest frequency response amplitude measurements. Fails when two compared frequencies exceed the set value. Assists in finding suck outs and high/low-end roll-off.
- **Maximum loss** — Overall attenuation limit in the coax transmission path. Fails when measured frequency loss exceeds the set value. Helps locate excessive total loss in coax networks.
- **Maximum adjacent delta** — Measured amplitude variation limit between two adjacent frequencies. Fails when comparing two adjacent frequencies that exceed the set value. Assists in finding suck outs and high/low-end roll-off.
- **MQI limit** — MoCA channels are dynamic and adjust subcarriers based on the frequency response of the 50-MHz-wide MoCA channel. SmartID calculates an easy-to-understand score based on how MoCA channels adapt to the coax network. The minimum value of the calculated MoCA Quality Index (MQI) score allowed determines the limit. Identifies when MoCA will experience slow communication speeds.
- **MoCA filter required** — If users select a service plan with a MoCA test, the SmartID mode will look for a MoCA filter. If a filter is not present, the limit will fail all MoCA transmission paths that do not meet this criterion. Helps identify the absence of MoCA filters.
- **Ingress** — Ingress is a broadband power measurement to detect power between 5 MHz and 1.5 GHz. This is a broadband-detection measurement rather than a narrowband, single-frequency measurement and, therefore, requires a much higher value limit than typical for ingress measurements. Helps isolate ingress source locations.

A description of each default service plan available for the DSAM is provided below.

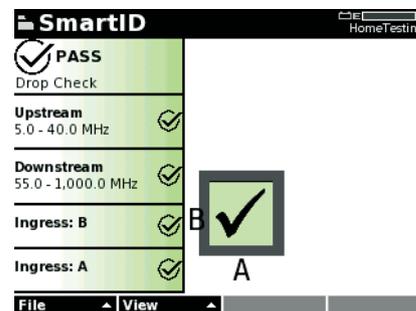
Drop Check

The Drop Check service plan checks single cable runs (also known as home runs) and is intended to validate primarily drop cables between the tap and ground block locations. The drop check limit defaults are listed below.

Upstream limits		Downstream limits	
Maximum peak to valley	2 dB	Maximum peak to valley	10 dB
Maximum loss	5 dB	Maximum loss	16 dB
		Maximum adjacent delta	2 dB
MoCA		Ingress	
MQI limit	Disabled	Broadband 5 – 1500 MHz	-5 dBmV
MoCA filter required	Disabled		

The Drop Check limits assume only one coax cable with a SmartID probe is connected at each end. Adding a normal loss splitter will cause the Drop Check to fail the maximum loss in the upstream. Drop Check limits also assume a drop cable length of 200 ft. Higher frequencies naturally have higher attenuation over the cable length to meet the SCTE maximum RG6 attenuation specifications at 1,000 MHz for 200 ft. Because drop cables only pass communications in the upstream and downstream frequency bands, MoCA limits are not available for Drop Check.

For shorter/longer drop cables at a tighter/wider specification, users simply create a new service plan and push it out to the DSAM via TPP.



Drop Check is designed to test single-run drop cables between the tap and ground block.

Voice Video Data

The Voice Video Data service plan validates the coax network inside the customer premises for those services transmitted within the upstream and downstream frequency bands. The plan assumes the home coax network has one or more splitters and multiple coax runs. This service plan will not test transmission from one customer premises equipment (CPE) location to another because it assumes MoCA services are not required.

Voice Video Data limit defaults are listed below.

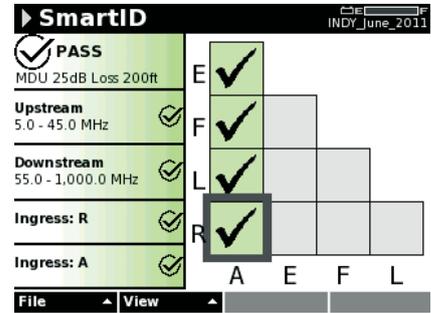
Upstream limits	
Maximum peak to valley	2 dB
Maximum loss	12 dB

Downstream limits	
Maximum peak to valley	12 dB
Maximum loss	20 dB
Maximum adjacent delta	2 dB

MoCA	
MQI limit	Disabled
MoCA filter required	Disabled

Ingress	
Broadband 5 – 1500 MHz	-5 dBmV

The setup for this plan connects one probe at the point of entry (POE) into the home and connecting the other SmartIDs at other outlets of interest. Typically, the ground block or a wiring closet within the premises is the POE. It is important to disconnect all CPE from the coax network to ensure that no live signals are present. The best practice of connecting the probes with the CPE coax jumper cables includes them as part of the coax network under test. The test result display shows grey unnavigable MQI boxes because this service plan does not include CPE-to-CPE testing.



The limits assume that two splitters are in the network, one two-way splitter and one four-way splitter. These limits test to the SCTE maximum RG6 attenuation specifications of 1,000 MHz over a total length of 200 feet between the POE and CPE locations where SmartIDs are connected. Another way to think of how the default limits are set is to consider that a typical channel level arrives at the POE at 15 dBmV and is attenuated to a level of -10 dBmV at the CPE location.

To accommodate shorter/longer drop cables a tighter/wider specification, users can simply create a new service plan and push it out to the DSAM via TPP.

Voice Video Data MoCA

The Voice Video Data MoCA service plan validates the coax network inside the customer premises for voice, video, data transmission as well as whole home digital video recorder (DVR), or MoCA, services in the upstream, downstream, and MoCA frequency bands. The plan assumes the home coax network has one or more splitters and multiple coax runs. This service plan includes tests between CPE locations because they require MoCA services and it includes a MoCA filter check.

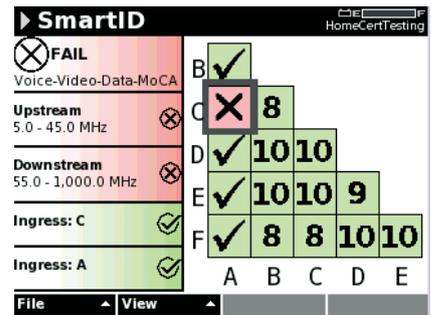
Voice Video Data MoCA limit defaults are listed below.

Upstream limits		Downstream limits	
Maximum peak to valley	2 dB	Maximum peak to valley	12 dB
Maximum loss	12 dB	Maximum loss	20 dB
		Maximum adjacent delta	2 dB

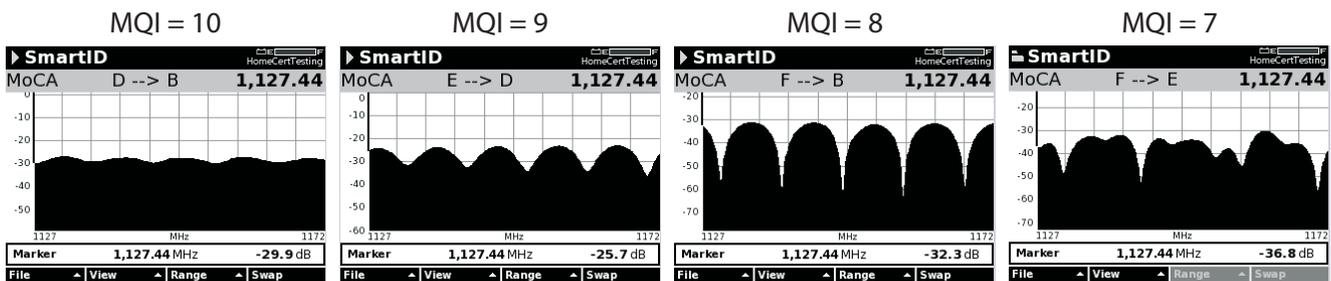
MoCA		Ingress	
MQI limit	7	Broadband 5 – 1500 MHz	-5 dBmV
MoCA filter required	Enabled		

The setup is identical to the Voice Video Data service plan with one probe connected at the POE into the home and connecting the other SmartIDs at other outlets of interest. Typically, the ground block or wiring closet within the premises is the POE. It is important to disconnect all CPE from the coax network to ensure that no live signals are present. The best practice of connecting the probes with the CPE coax jumper cables includes them as part of the coax network under test.

The major difference between this and other service plans is the inclusion of MoCA frequency testing. Inherent in MoCA technology is a very steep waterfall effect, and the MQI algorithm described previously accommodates robust MoCA capabilities. The MQI approximates communication speeds between two or more MoCA-enabled devices. The default limit 7 indicates a throughput capability of approximately 204 to 216 Mbps, a speed most non-problematic coax networks can easily obtain. This service plan also verifies the presence of MoCA filters between the SmartID located at the POE and others connected at CPE locations. If a MoCA filter is not present, an X appears on the SmartID qualification screen indicating such.



All POE-to-CPE and MQI boxes are navigable to identify failures.



The system analyzes MoCA adjustments to subcarrier modulations to determine MQI scores. As the MoCA channel frequency response worsens, throughput decreases.

The limits assume that two splitters are in the network, one two-way splitter and one four-way splitter. These limits test to the SCTE maximum RG6 attenuation specifications at 1,000 MHz over a total length of 200 feet between the POE and CPE locations where SmartIDs are connected. Another way to think of how the default limits are set, is to consider that a typical channel level arrives at the POE at 15 dBmV and is attenuated to a level of -10 dBmV at the CPE location.

To accommodate shorter/longer cables, more/less overall loss, or a different MQI minimum score may require a tighter/wider specification. Also, supervisors can activate/deactivate MoCA filter detection by simply creating a new service plan and pushing it out to DSAMs via TPP.

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