



## 860 DSPi Pocket DQ and PP-30

### Typical PP-30 Measurements and Using the 860 DSPi to Find & Fix the Problems

## Speech & DTMF Performance

Summary View [Detailed View](#) [QoS Analysis View](#) [Test Call View](#) [Show report specs](#)

Test calls: 300

Service Level Class:

Origin: USA

Destination	Carrier	CCR	Speech				Clipping	Frame Muting	Noise	Delay	Tone Detection
			MOS LQ	MOS VQES	Unsatisf. Users	Power	Overall		WBN/Confort	RTD	DTMF Overall
			(1-5)	(1-5)	%	dBm	%		dBrn	ms	%
USA	NONE	97.2	3.93	3.89	20.4	-34	0.8	1.1	21	325	96.9
<b>Summary</b>		<b>97.2</b>	<b>3.93</b>	<b>3.89</b>	<b>20.4</b>	<b>-34</b>	<b>0.8</b>	<b>1.1</b>	<b>21</b>	<b>325</b>	<b>96.9</b>

■ Critical ■ Major ■ Minor ■ Warning ■ Excellent

DirectQuality report generated on 2006-05-11 14:35:11  
Measurements performed by PowerProbe service level probes.

## Typical PP-30 Measurements

Network Timers: Post-Dial Delay and Dial Tone Delay (typical DTD on a regular PSTN line is usually around 200 ms and for most PacketCable environments. Speech Power, Echo & Noise: Significant number of calls with Echo detected (about 40%). Typically any EPL (Echo Path Loss) value in the 25dB range is good. This means that the perceived echo is 25dB (or more) quieter than the initial voice utterance, and not very perceivable. EPD (Echo Path Delay) is usually close to the RTD measurements, therefore perceived Echo Path Delay will be about the same delay as RTD.

Voice Quality: Based on MSO data and other VoIP deployments, the LQ and VQES MOS thresholds are now set to 3.8 as a cut-off (for G.711 codec implementations). This revised threshold would give a lot more Green than yellow. These Voice Quality scores are mostly affected by occasional In-Between Clipping events, as well as Frame Muting and Speech Distortion. The Clipping events are generally caused by poor performing VADs (Voice Activity Detection), where the speech is being cut or clipped abruptly, instead of transitioning smoothly between periods of silence and periods of speech activity. When Clipping Ratio exceeds 1.0%, there will be some degradation of the voice quality. Frame Muting Ratio is the analog approximation of packet loss. Generally this number should be less than 1.0%, and when it is not, the MOS scores are significantly affected (especially LQ MOS). Packet Loss is a common problem in VoIP. Speech Distortion also seems to be an issue, usually caused by IP impairments (e.g. Packet loss and jitter). This is a unit-less measurement, it is a factor from 0 to 10, 0 being "no distortion" and 10 being "total distortion". Typically, the target is 2.5 or less for Speech Distortion. There also appears to be consistent DTMF dropping, typically an MTA provisioning issue.

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## PP-30 Tests and How to Fix

### Connection Status Failure

- Test could not connect
  - Check home wiring

### Network Timer Failure

- Indications of excessive latency in the Ethernet path
  - Check router configuration
- Indications of excessive latency in the RF path
  - This indicates a plant issue and rely on the techs field knowledge of the 860DSPi to find and fix the impairment
  - Perform the VoIP RTP test
    - MOS & Latency
  - Perform the Ping test
    - Latency
    - Packet Loss

### Intermittent DTMF Failure

- A different DTMF digit fails on separate consecutive calls
  - This is attributed to packet loss in the network
- Verify on the 860DSPi
  - MER, BER, Signal Levels, Ingress, and Noise
  - Perform the Ping test
    - Latency
    - Packet Loss

### Consistent DTMF Failure

- Consistent failure on the customers CPE (Phone) but tests pass on PP30
  - CPE is faulty
- Consistent failure with PP30 but PP30 is known to pass a test from another location
  - This indicates a faulty eMTA not interpreting DTMF correctly
- Consistent failure with PP30 but PP30 will not work anywhere in the network
  - Problem here could be the encode or decode of the switch or remote unit

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### Low MOS Scores

- Indications of Jitter, excessive latency in the RF path
- This typically requires further testing to isolate where in the network if any that calls pass or fail
- Typically at this point if the call passes in the hub directly form the CMTS
  - Then this indicates a plant issue and rely on the techs field knowledge of the 860DSPi to find and fix the impairment
    - Verify MER, BER, & Signal Levels
    - SSR mode
      - Test for ingress and or noise
    - Perform the VoIP RTP test
      - MOS, Latency, & Jitter
    - Perform the Ping test
      - Latency & Jitter

### Systems that Worked Fine at QPSK and are Now 16QAM and Having Issues

- At slower transmit speeds and lower modulation methods, packet loss is lower and the system can handle worse signal quality
- Use the 860DSPi to find and fix
  - Perform the VoIP RTP test
    - MOS, Latency, & Jitter
  - SSR mode
    - Ingress and Noise
  - Perform the Ping test
    - Latency, Packet Loss, & Jitter

### Speech Quality Failure

- Indications of Jitter, excessive latency in the RF path
- This typically requires further testing to isolate where in the network if any that calls pass or fail
- Typically at this point if the call passes in the hub directly form the CMTS
  - Then this indicates a plant issue and rely on the techs field knowledge of the 860DSPi to find and fix the impairment
    - SSR mode
      - Test for ingress and or noise
    - Perform the VoIP RTP test
      - MOS, Latency, & Jitter
    - Perform the Ping test
      - Latency & Jitter

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### VoIP Transmission Failure

- Clipping or lost packets
- Typically at this point if the call passes in the hub directly form the CMTS
  - Then this indicates a plant issue and rely on the techs field knowledge of the 860DSPi to find and fix the impairment
    - SSR mode
      - Test for ingress and or noise
    - Perform the VoIP RTP test
      - MOS, Latency, & Jitter
    - Perform the Ping test
      - Latency, Packet Loss & Jitter

### Delay Failure

- Indications of Jitter, excessive latency in the RF path
- This typically requires further testing to isolate where in the network if any that calls pass or fail
- Typically at this point if the call passes in the hub directly form the CMTS
  - Then this indicates a plant issue and rely on the techs field knowledge of the 860DSPi to find and fix the impairment
    - SSR mode
      - Test for ingress and or noise
    - VoIP RTP test
      - MOS, Latency, & Jitter
    - Ping test
      - Latency & Jitter

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### Echo Failure

- This could be a Echo delay or a Echo Path Loss problem
  - First determine if the customer is having an issue with “Listener Echo” or “Talker Echo”. If the echo is occurring on the opposite end of the phoneline then the issue is “Listener Echo” and is an issue with the customer. If the issue is occurring on the customer’s end of the phone call then it is a “Talker Echo” issue and is with the person on the other end.
  - A quick test for echo would be to press a DTMF tone on the customer’s check to see if this eliminates the echo. A DTMF tone will disrupt the RTP stream and cause it to realign.
  - Be sure the ECAN (Echo Canceller) is activated in your customers MTA.
  - A customer’s wireless phone/headset can introduce a certain level of echo. Try asking your customer to turn on the speakerphone, if there isn’t echo then the wireless phone is at fault.
- If the problem is Echo delay and the call passes in the hub at the CMTS
  - Then this indicates a plant issue and rely on the techs field knowledge of the 860DSPi to find and fix the impairment
    - SSR mode
      - Test for ingress and or noise
    - Perform the VoIP RTP test
      - MOS, Latency, & Jitter
    - Perform the Ping test
      - Latency & Jitter

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Most of the above problems will drill down to latency and jitter or packet loss. The VoIP test in the 860DSPi displays these tests and will give a MOS for both the forward and reverse. This will be your most valuable tool. This will show where these problems occur forward or reverse. The way to fix these problems is the same as in the past divide and conquer. This means from the point at which the problem occurs work back to the headend until there is no problem. Then the problem is between the last point and this point. This will help to isolate the affected area. Also, Leakage, Return Monitoring, and Sweeping the return path are vital to provide quality VoIP service.

**Notes:** The High QoS for VoIP is granted to EMTA's by the CMS (Call Management Server). An EMTA logging onto the system sets up access to the CMS with a dialog with the CMTS using the normal low-level QoS. Once into the CMTS, the EMTA contacts the CMS. The CMS recognizes the caller as an EMTA, consults its instructions for call QoS and sets up the equipment in the call path, including the terminal devices' QoS.

The Packet Cable standard provides an alternate way of establishing High QoS for a selected terminal device. The CMTS itself can be configured to grant a specified QoS to the device when it logs onto the CMTS without reference to a CMS.

- The same Cable Modem MAC cannot be configured on both the HSD CMTS and the VoIP CMTS
  - 860DSPi Dual MAC option

If the customer complains of any of these problems:

- They cannot dial 800 numbers
- They cannot call certain phone numbers
- They cannot be called via certain phone numbers the problem is with their old phone company.
  - The previous phone company must release that phone number.

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