

Jitter Questions Answered ...

... Jitter Measurement Problems Solved

1. Does my product fulfill the jitter recommendations?

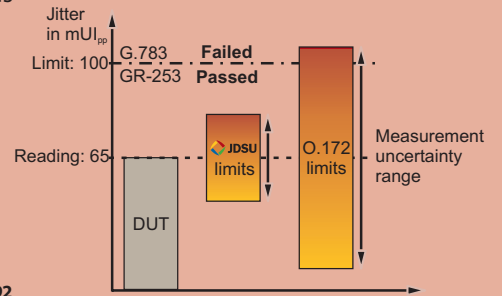
A test solution must provide:

- High receiver accuracy for precise jitter measurement
 - ➔ JDSU offers high accuracy and low noise at all rates
- ITU-T proven reliability
 - ➔ JDSU uses a unique in-house reference transmitter to develop and calibrate instruments according to the latest ITU-T O.172 App. VII and VIII recommendations
 - ➔ JDSU delivers Accuracy Maps



2. How can I build confidence in my product's jitter test results?

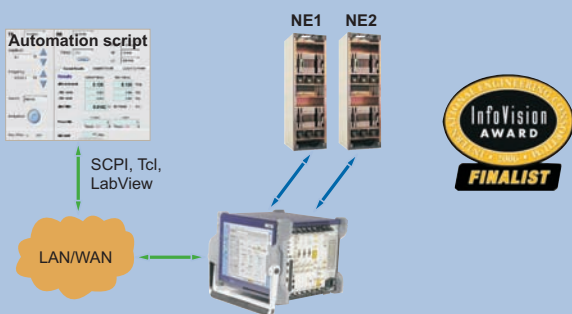
- High accuracy receiver minimizes measurement uncertainty to ensure most reliable and repeatable results with comfortable margins
- JDSU ONT solution is a reference at many equipment manufacturers, component vendors and operators
- High repeatability of intrinsic jitter tests avoids "finger pointing" issues



Example: STM-64/OC-192

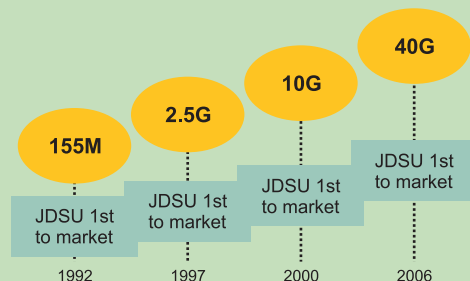
3. How can I reduce jitter testing times?

- Easy remote control and scripting for fully automated test cases
- Auto-modes for industry standard jitter transfer function (JTF) and maximum tolerable jitter (MTJ)
- Multiple independent jitter tests can be supported in single mainframe



4. Is my jitter tester a reliable, future proof solution?

- JDSU is the leading jitter test supplier for over 20 years
- JDSU continues to lead worldwide standardization and process improvement for jitter test equipment
- JDSU continues to invest heavily in the flagship ONT platform and maintains a worldwide expert support network



Jitter Standards - Test Equipment

- ITU-T O.172 for SDH systems
- ITU-T O.173 for OTN systems

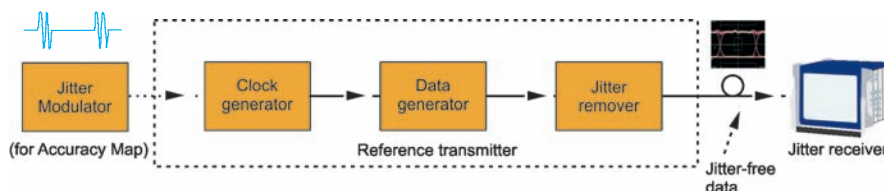
Measurement filters	High-pass f_1	High-pass f_3	High-pass f_4
STM-1/OC-3	500 Hz	65 kHz	1.3 MHz
STM-4/OC-12	1 kHz	250 kHz	5 MHz
STM-16/OC-48/OTU1	5 kHz	1 MHz	20 MHz
STM-64/OC-192/OTU2	20 kHz	4 MHz	80 MHz
STM-256	80 kHz	16 MHz	320 MHz
OC-768/OTU3	20 kHz	16 MHz	320 MHz

Receiver Fixed Error (W) in UI _{pp}	SDH/SONET/OTN	
	Wideband $f_1 - f_4$	High-band $f_3 - f_4$
STM-1	0.07	0.035
STM-4	0.1	0.035
STM-16/OTU1	0.1	0.035*/0.050
STM-64/OTU2	0.1*/0.15	0.035*/0.050
STM-256	0.15	0.05
OTU3	0.2	0.05

* updated in April 2005

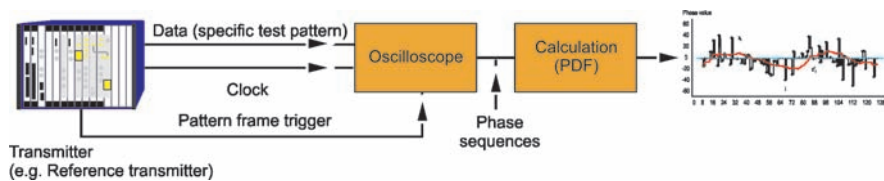
ITU-T O.172 Appendix VII:

Method to verify the measurement result accuracy of a jitter receiver.



JDSU is the only vendor that complies with both ITU-T appendices and delivers Accuracy Maps

ITU-T O.172 Appendix VIII:



Method to characterize the intrinsic jitter of a transmitter.

Jitter Standards – Network Equipment – Jitter Generation

Equipment	Standard	Bit rate	Jitter limits	
			Wide-band jitter/UI _{pp}	High-band jitter/UI _{pp}
OTN	ITU-T.G.8251	OTU1/OTU2	0.3	0.1
		OTU3	1.2	0.1/0.15*
OTN (SDH interface)	ITU-T.G.8251	STM-16/64	1.0	0.1
		STM-256	1.0	0.1/0.15*
SDH (TM, ADM, DXC, etc.)	ITU-T.G.783 ITU-T.G.813 ETSI EN 300 462-5-1	ANSI T1.105.03	OC-1/3/12/48	0.01 UI _{rms} (12 kHz)
			OC-192	0.3
		Telcordia GR-253 (updated in December 2005)	OC-1/3/12/48	0.1 (0.01 UI _{rms})
			OC-192	0.3
			OC-768	1.2
SDH regenerators	ITU-T G.783	STM-1/4/16/64	0.3	0.1
		STM-256	0.3*	0.1/0.15*

* ITU-T proposal February 2008

For more information, please see our white paper "Jitter Measurements in Telecom Transmission Systems– Improving Accuracy and Repeatability" under www.jdsu.com/test_and_measurement/technical_resources/.

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