40 Gbit/s NETWORK PERFORMANCE AND SERVICE DISRUPTION TIME MEASUREMENT

By Mai Abou-Shaban, Product Specialist–Transport and Datacom Business Unit

As the responsibilities of telecom field-installation personnel increase–from testing traditional and lower-rate SONET/SDH networks primarily used to transport telephony and private-line services to higher-speed (40/43 Gbit/s) networks supporting multiservices including packet-based services–the performance requirements of the underlying transport networks become more stringent, making testing and qualification of these transport networks more challenging.

This application note outlines the service disruption time (SDT) measurement approach of EXFO's FTB-8140 Transport Blazer 40/43 Gigabit SONET/SDH Test Module that should be performed during the installation and commissioning of network elements and their new circuits.

Service Disruption Time

Service disruption time (SDT), typically used to complement the automatic protection switching (APS) function, measures the duration of a disruption associated with a received signal at the transport layer to ensure that working circuits can switch to protection within the 50 ms window specified by the ITU G.841 standard. The FTB-8140 Transport Blazer test module can be used to initiate switch-over conditions using K1/K2 overhead bytes as part of its supported APS function. Customers typically set the layer to pattern and the defect selection to bit error as part of the SDT measurement to ensure the integrity of the transported payload (i.e., customer traffic).

The following table lists the FTB-8140 supported and user-selectable layers of SONET/SDH optical signal and their corresponding defect selection under the SDT function:

Layer		Defect Selection
Port		LOS
SDH	Regenerator Section	FAS, LOF, OOF, B1
	Multiplex Section	MS-AIS, MS-RDI, MS-REI, B2
	HOP	AU-AIS, AU-LOP, HP-RDI, ERDI-SD, ERDI-CD, ERDI-PD, HP-REI, B3
SONET	Section	FAS, LOF, SEF, B1
	Line	AIS-L, RDI-L, REI-L, B2
	HOP	AIS-P, LOP-P, PDI-P, RDI-P, ERDI-PSD, ERDI-PCD, ERDI-PPD, REI-P, B3
Pattern		Pattern Loss, Bit Error

Table 1. SONET/SDH SDT layers and triggers

When the SDT function is enabled, it waits for a defect to appear. The measurement is then triggered with the detection of the first defect (as shown in Figure 1). At this point, the test period starts and the SDT begins to measure the time spent in the test-period window for the duration of the disruption. The test period itself is user-configurable and represents the period of time used to calculate the SDT measurement. When there is an absence of defects for a period exceeding the no-defect time, which is also user-configurable, the SDT ends its measurement. The SDT measurement duration is then calculated as the time between the detection of the first defect to the end of the last defect. Note that the SDT measurement does not include the no-defect time.

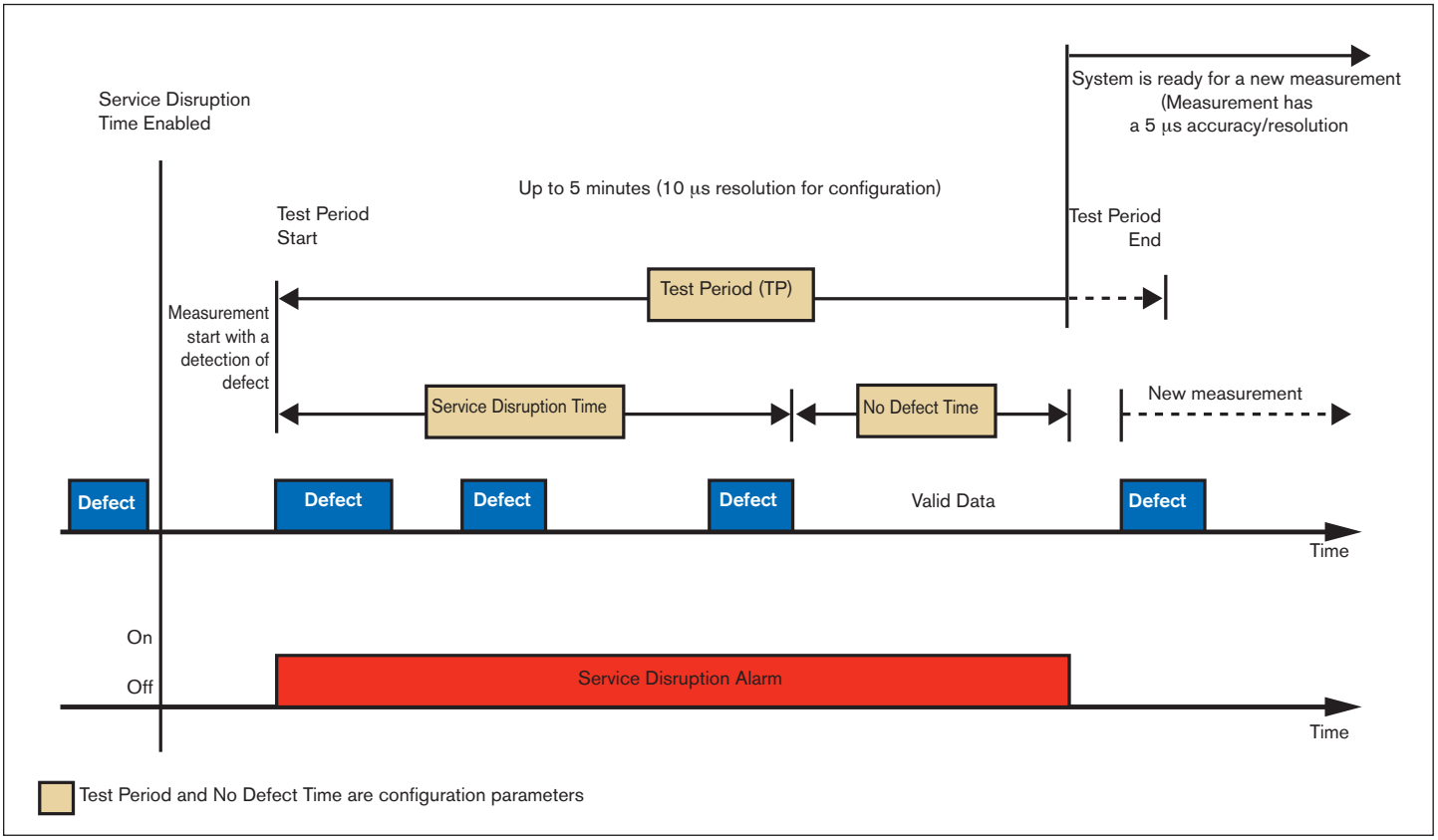

Figure 1. Service disruption test

Advantages of an SDT Implementation

The main advantage of EXFO's SDT implementation is its precision and ability to identify multiple disruptions on the network–even when they occur within a short period of time. It also supports a parent defect approach where the SDT measurement is triggered when the selected defect or higher defect is detected. EXFO's Transport Blazer's SDT function supports multiple statistics (shown in Figure 2), including the duration of the shortest disruption measured, longest, last, average and total duration of all the measured disruptions. In addition, the SDT function supports an alarm summarizing each second including a defect measured by SDT number of disruption measured alarm and total SDT in seconds. All SDT measurements are provided with a resolution of 5 µs for all supported layers. Since the SONET/SDH events are frame-based, measurements are reported as increments of 125 µs with a resolution of 5 µs.

Figure 2. SDT statistics and alarms

Conclusion

SONET/SDH-based networks have proven to be the most robust transport solutions available, and the 40 Gbit/s transmission systems being deployed today will continue to be the choice for carriers who demand a stable and resilient method for delivering next-generation services. EXFO's SDT function on all the Transport Blazer modules provides the precise measurements required to protect the transport network, ensuring it can switch within the industry-standard 50 ms window and identify the number of defects that occurred with detailed statistics, setting a new standard in low and high-speed test and measurement solutions.

EXFO Corporate Headquarters > 400 Godin Avenue, Quebec City (Quebec) G1M 2K2 CANADA | Tel.: +1 418 683-0211 | Fax: +1 418 683-2170 | info@EXFO.com

Toll-free: +1 800 663-3936 (USA and Canada) | www.EXFO.com

EXFO America	3701 Plano Parkway, Suite 160	Plano, TX 75075 USA	Tel.: +1 800 663-3936	Fax: +1 972 836-0164
EXFO Asia	151 Chin Swee Road, #03-29 Manhattan House	SINGAPORE 169876	Tel.: +65 6333 8241	Fax: +65 6333 8242
EXFO China	No. 88 Fuhua First Road Central Tower, Room 801, Futian District	Shenzhen 518048 P. R. CHINA	Tel.: +86 (755) 8203 2300	Fax: +86 (755) 8203 2306
	Beijing New Century Hotel Office Tower, Room 1754-1755 No. 6 Southern Capital Gym Road	Beijing 100044 P. R. CHINA	Tel.: +86 (10) 6849 2738	Fax: +86 (10) 6849 2662
EXFO Europe	Omega Enterprise Park, Electron Way	Chandlers Ford, Hampshire S053 4SE ENGLAND	Tel.: +44 2380 246810	Fax: +44 2380 246801
EXFO Service Assurance	285 Mill Road	Chelmsford, MA 01824 USA	Tel.: +1 978 367-5600	Fax: +1 978 367-5700

APPNOTE215.1AN

Printed in Canada 09/03

EXPERTISE REACHING OUT