

Networks

SpliceLoss Template and Report Generation Procedure – Using Smart Template Networks Version 1.18 and later

Introduction

This application note is targeted at field service personnel, specifically those who install or maintain fiberoptic transmission lines, who wish to fully maximize the application of NetWorks 1.18 for fiber traces. It expands on the current content offered in the software's "help" menu. This document outlines step-by-step instruction for the user to: create a new trace list, display selected traces – and utilize analysis thresholds to run the Fiber Analysis Software (FAS). This allows batch processing of all traces to the same parameters.

Anritsu Company's network software emulation tool (in a Windows environment) increases the efficiency of users, allowing a company's equipment to remain in the field where it is needed the most. It analyzes, reports and prints OTDR and loss test set data in an easy-to-read report, suitable even for those who are unfamiliar with OTDR operations. It shows all splice losses in the A to B direction correlated with splices in the B to A direction – including location and PASS/FAIL status based on user defined thresholds. The summary report permits the selection of a trace for an application as a template, the insertion of new events onto the template and then the application of this template to all other traces.

This document also includes instruction for applying the latest feature added to this software – the Smart Template. The Smart Template simplifies the process of creating a trace template.

OTDR and Fiber Traces

Optical Time Domain Reflector (OTDR) is an instrument that analyzes the light loss in an optical fiber. It is used in optical network troubleshooting. It injects a short, intense laser pulse into the optical fiber and measures the backscatter and reflection of light as a function of time. The reflected light characteristics are analyzed to determine the location of any fiber optic breaks or splice losses.

1. CREATE TRACE FOLDERS TO HOUSE TRACES AND TRACE REPORTS. Using **WINDOWS EXPLORER**, copy all trace files to an aptly named directory. In this directory create subfolders for each span.

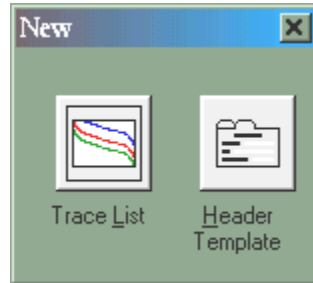
For example:

- A. XXXYYY13 – this will contain the 1310 traces from XXX to YYY.
- B. XXXYYY13 – this will contain the 1310 traces from XXX to YYY.
- C. YYYXXX13 – this will contain the 1310 traces from YYY to XXX.
- D. XXXYYY15 – this will contain the 1550 traces from XXX to YYY.
- E. YYYXXX15 – this will contain the 1550 traces from YYY to XXX.
- F. ORIGINALS – this will contain all traces, in both directions.

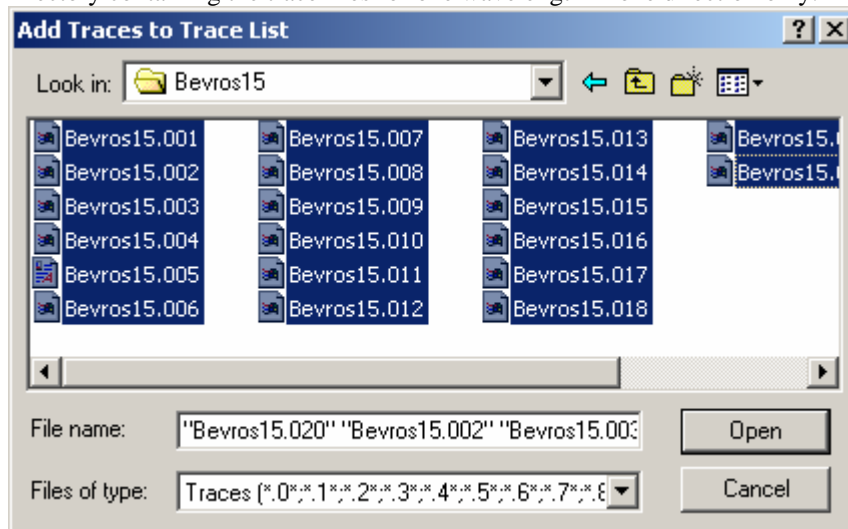
NOTE: It is best to work with copies of the traces, as some functions are not reversible.

2. **CREATE A NEW TRACE LIST FOR THE TRACES IN ONE DIRECTION, FOR ONE WAVELENGTH ONLY.**

- A. Open **NETWORKS** by double-clicking on the **NETWORKS ICON**.
- B. Select **FILE / NEW**.
- C. Click on the **TRACE LIST ICON**.



- D. Select **TRACE / ADD** to open the ADD TRACES TO TRACE LIST window.
- E. Select a Directory containing the trace files for one wavelength in one direction only.

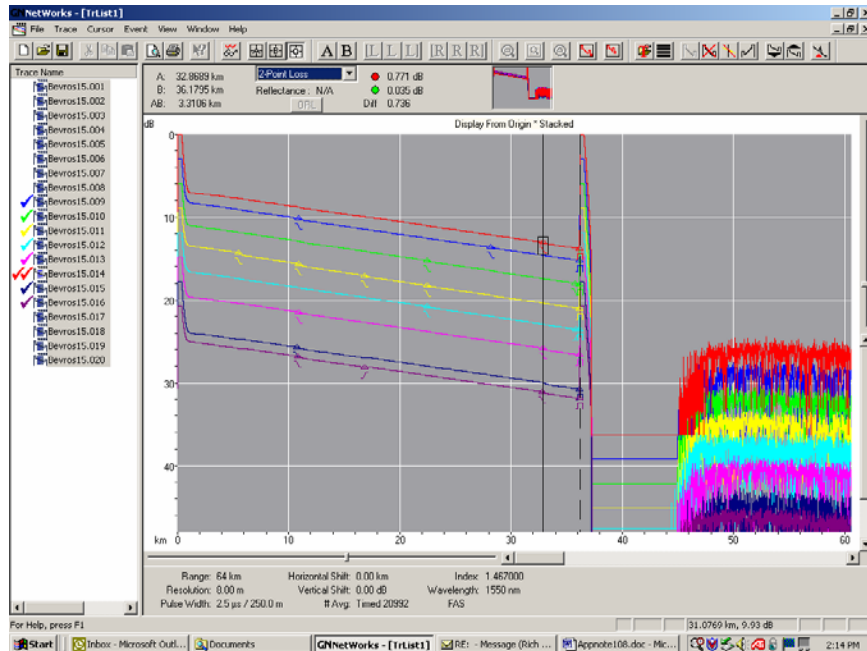


NOTE: If some or all of the traces are not shown, change the FILES OF TYPE to ALL FILES.

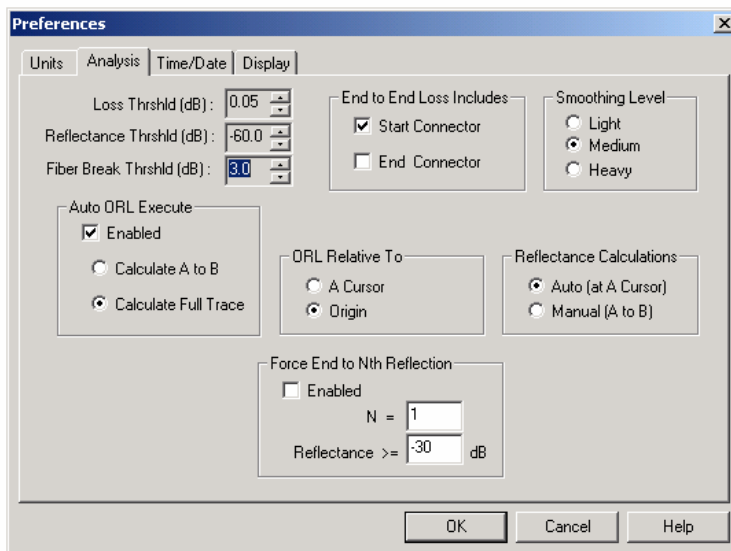
- F. Highlight all traces to add to the trace list (highlight the first trace, hold the SHIFT Key Down, then click on the last trace) this will select all traces at once.
- G. Click **OPEN** to add these traces to the trace list.

3. **SELECT AND DISPLAY TRACES IN THE TRACE LIST.**

- A. Select **TRACE / SELECT ALL** to highlight (select) all traces.
- B. Select **TRACE / DISPLAY** to display traces (up to eight at one time).
- C. Select **VIEW / STACK**. STACK should be checked (✓).



4. **SET FIBER ANALYSIS THRESHOLDS IN PREPARATION TO RUN THE FIBER ANALYSIS SOFTWARE (FAS).** Select **FILE / PREFERENCES / ANALYSIS**, the set the parameters as follows:
- Set the FAS thresholds to 0.05dB for splice loss, -60.0 for reflectance threshold and 3.0 dB for end detect.
 - Set Auto ORL Execute to enabled, calculate full trace.
 - Set ORL relative to origin.
 - End-End loss to include start connector.
 - Set Reflectance calculations to Auto.
 - The remaining parameters are not significant at this time.
 - Click **OK**.
- NOTE:* These values can be changed as needed.



5. BATCH PROCESS ALL TRACES TO RESET THE APPLICABLE PARAMETERS TO THE SAME SETTINGS.

NOTE: Batch processing allows a number of different actions to be performed on multiple traces from a single selection menu. It also creates an on screen report providing information such as the min / max number of events and the min / max end distances for all trace files selected. This allows a common starting point from which all the traces can be reviewed and serves as a quick check to see if problematic traces are present. Additionally, it also determines which trace might best represent the number of true events.

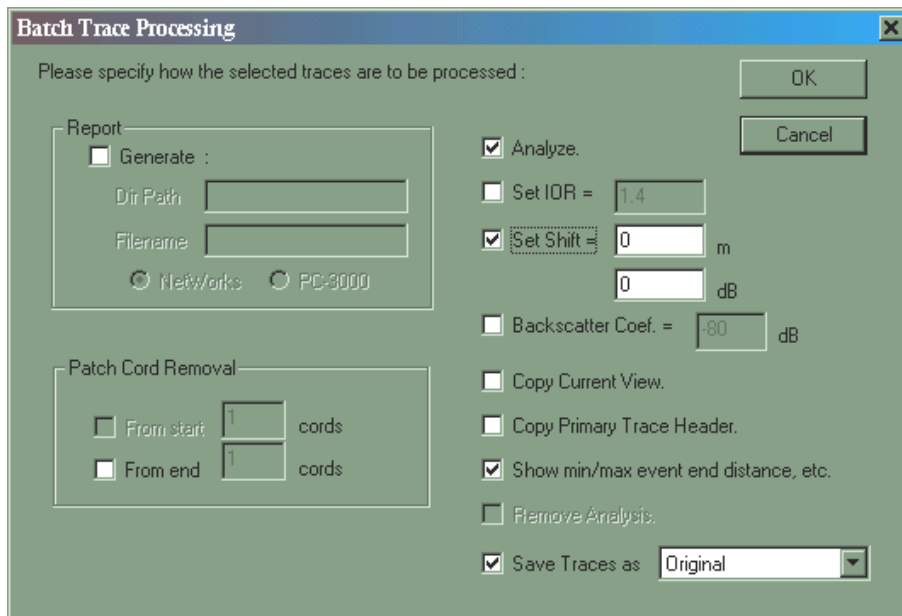
A. Select the traces to process (highlight the first trace, hold the SHIFT Key Down, then click on the last trace).

B. Select **TRACE / BATCH PROCESS** to begin and generate the min/max listings.

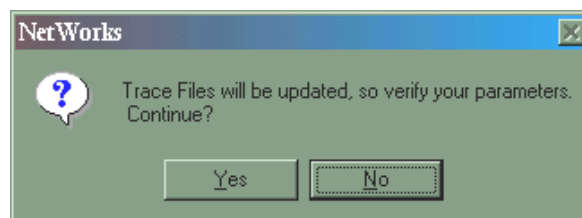
- 1) Check (✓) *Analyze.*
- 2) Change the IOR to the correct value, if change is required.
- 3) Check (✓) *Patchcord removal if necessary.*

Note: Patchcord removal will insert a negative horizontal shift for the length of the launch cord that was used. Since launch cords are not used on all testing you will first need to determine whether a cord was used or not, typical lengths are 1km or 3km.

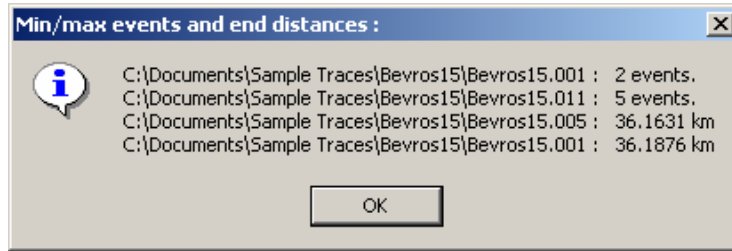
- 4) Check (✓) *Show min/max event end distance, etc.*
- 5) Check (✓) *Save Traces as **Original**.*
- 6) Click **OK**.



7) Click **YES** to **Networks** Window "Trace Files Will Be Updated, So Verify Your Parameters. Continue."



6. **REVIEW SHOW MIN/MAX EVENTS AND END DISTANCES.** Refer to the number of Min / Max Events and the Min / Max End Distances shown in the “ Min/Max Events And End Distances:” Window.



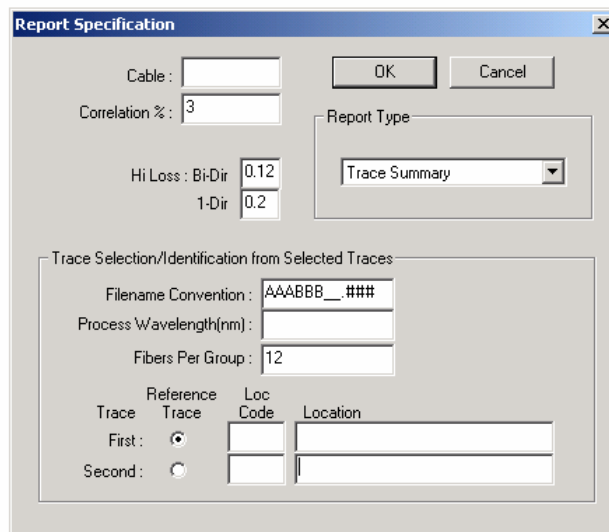
- A. Make a note of the trace that displays the max number of events and correct end distance.
 B. Click **OK** to continue.

7. **GENERATE A TRACE SUMMARY REPORT FOR ALL TRACES.**

NOTE: The Trace Summary Report enables us to verify that all fibers are present and that the same Wavelength, Distance Range, Distance Resolution, Number Of Averages and Pulse Widths were used, for consistency in comparing. Discrepancies in this information may produce difficulties in generating The Uni- and/or Bi-Directional Reports.

- A. Select **FILE / PRINT / REPORT / TRACE SUMMARY**, to generate a TRACE SUMMARY REPORT.
 B. The remaining sections can be filled in as described below.

- **Correlation %:** Correlation window for the events on the primary trace.
- **Hi Loss:** Events that break these thresholds will appear in bold on the reports.
- **Process Wavelength:** The wavelength of the traces that you are currently working on.
- **Fibers Per Group:** Will insert a blank line after that number of fibers on the reports.
- **Filename Convention:** Must be entered using the following characters in the format of the trace filenames. (*Example shown below*).
 - A Indicates a **From** location code character
 - B Indicates a **To** location code character
 - _ Indicates a **wavelength** character
 - # Indicates a **Fiber number** character



- C. Click **OK** to print Report.
NOTE: Refer to attached Trace Summary Report for sample.

8. REVIEW THE TRACE SUMMARY REPORT.

- A. Verify that all fibers are present.
- B. Verify consistency in the wavelength, Distance Range and Resolution, number of Avgs., Pulsewidth, End Length (Approximate), ORL (make sure values are present), Index of Refraction, Vertical and Horizontal Shift, and Backscatter Coefficient.

NOTE 1: Small differences in the number of averages, range and resolution can be tolerated.

NOTE 2: The end length is the most important parameter. Small differences are expected due to the helix factor (2-6% is typical dependant upon cable type and count), but all significant discrepancies should be investigated.

NOTE 3: T4 files cannot store ORL values.

NOTE 4: Any and all discrepancies in the trace summary report should be noted.

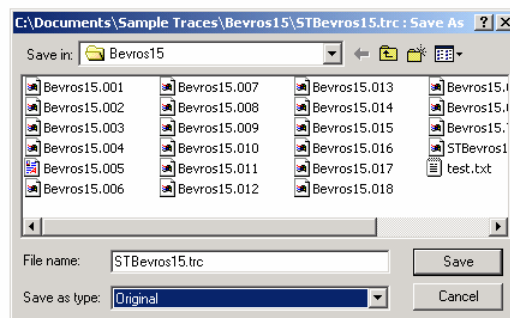
- 9. INVESTIGATE ANY LONG OR SHORT TRACES.** Reanalyze with different FAS thresholds to verify results. If fibers are broken, remove their analysis and document the fiber and breakpoint. If the fiber length can't be reanalyzed properly by changing the FAS thresholds, edit the end event to the proper location.

Trace	Wavelength (nm)	Range (m)	Pulse Width (nsec)	Reso (m)	# Avgs	Date	Time	Instrument	Optics Module	Fiber Type
Bevros15.001	1550	64	2500	8.00	19712	12/05/99	02:40 PM	CM48000	CM4436	Singlemode
Bevros15.002	1550	64	2500	8.00	20736	12/05/99	02:51 PM	CM48000	CM4436	Singlemode
Bevros15.003	1550	64	2500	8.00	19712	12/05/99	02:59 PM	CM48000	CM4436	Singlemode
Bevros15.004	1550	64	2500	8.00	19712	12/05/99	03:02 PM	CM48000	CM4436	Singlemode
Bevros15.005	1550	64	2500	8.00	19712	12/05/99	03:05 PM	CM48000	CM4436	Singlemode
Bevros15.006	1550	64	2500	8.00	19712	12/05/99	03:12 PM	CM48000	CM4436	Singlemode
Bevros15.007	1550	64	2500	8.00	13668	12/05/99	03:15 PM	CM48000	CM4436	Singlemode
Bevros15.008	1550	64	2500	8.00	14940	12/05/99	03:20 PM	CM48000	CM4436	Singlemode
Bevros15.009	1550	64	2500	8.00	19712	12/05/99	03:22 PM	CM48000	CM4436	Singlemode
Bevros15.010	1550	64	2500	8.00	20736	12/05/99	03:32 PM	CM48000	CM4436	Singlemode
Bevros15.011	1550	64	2500	8.00	19712	12/05/99	03:34 PM	CM48000	CM4436	Singlemode
Bevros15.012	1550	64	2500	8.00	19640	12/05/99	03:42 PM	CM48000	CM4436	Singlemode
Bevros15.013	1550	64	2500	8.00	17920	12/05/99	03:47 PM	CM48000	CM4436	Singlemode
Bevros15.014	1550	64	2500	8.00	20992	12/05/99	03:52 PM	CM48000	CM4436	Singlemode
Bevros15.015	1550	64	2500	8.00	19712	12/05/99	03:57 PM	CM48000	CM4436	Singlemode
Bevros15.016	1550	64	2500	8.00	20736	12/05/99	04:07 PM	CM48000	CM4436	Singlemode
Bevros15.017	1550	64	2500	8.00	20480	12/05/99	04:09 PM	CM48000	CM4436	Singlemode
Bevros15.018	1550	64	2500	8.00	21248	12/05/99	04:19 PM	CM48000	CM4436	Singlemode
Bevros15.019	1550	64	2500	8.00	20992	12/05/99	04:26 PM	CM48000	CM4436	Singlemode
Bevros15.020	1550	64	2500	8.00	20992	12/05/99	04:30 PM	CM48000	CM4436	Singlemode

- 10. ONCE ALL TRACES ARE ACCOUNTED FOR AND “FIXED”, SELECT A TRACE TO USE AS THE TEMPLATE.** Choose and display any trace with the correct end length; this will become the Template trace.

- 11. MAKE A COPY OF THIS TRACE.** Name it STXXXYYY.trc (add ST to the beginning of the filename and change the extension to .trc).

- A. Left-Mouse click to highlight the trace just selected to be the Template Trace.
- B. Select **TRACE / SAVE AS / STXXXYYY.trc**. Save to the same directory as the trace files in the current trace list.

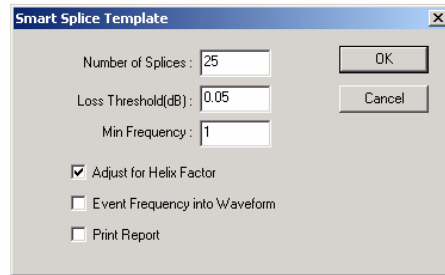


12. ADD THE TEMPLATE TRACE TO THE TRACE LIST AND MAKE IT THE PRIMARY TRACE.

- A. Add the Template trace that was saved in the last step, to the trace list.
 - 1) Select **TRACE / ADD** to open the ADD TRACES TO TRACE LIST window.
 - 2) Select the Directory containing the new Template trace file.
 - 3) Highlight the Template Trace to add to the trace list.
 - 4) Click **OPEN**, to add this trace to the trace list.
- B. Once in the Trace List, left-mouse click on the selected trace.
- C. Select **TRACE / DISPLAY** to display the trace.
- D. Right-mouse click on the selected trace.
- E. Make it the *primary* trace.

13. BUILD A SPLICE TEMPLATE FOR THE TRACES IN ONE DIRECTION FOR ONE WAVELENGTH using the *Smart Template Feature*.

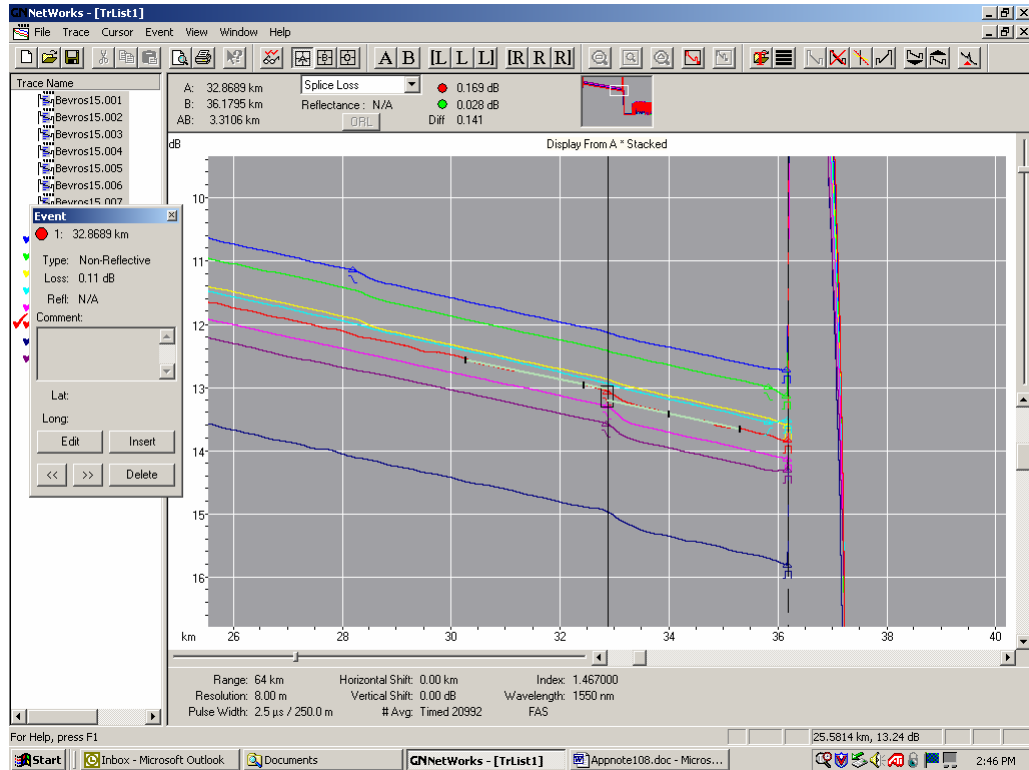
- A. Make the copied trace the primary, Select all the traces in your trace list.
- B. Select **TRACE / SMART SPLICE TEMPLATE**.



- C. Select the various options and set parameters as described in the following sections.
 - 1) **Number of Splices** Type in the number of known splices or, if unknown, choose any number greater than the possible number of splice points (20 or 25).
 - 2) **Loss Threshold** A value greater than the analysis threshold is recommended to reduce the number of events caused by noise on the traces.
 - 3) **Min. Frequency** Only events that occur with a frequency greater than or equal to the minimum frequency will qualify as an event in the splice template. This value will need to be changed depending on the number of traces being analyzed.
 - 4) **Adjust For Helix factor** Select to compensate for any helix factor adjustment needed.
- D. Click **OK**.
- E. Verify that the smart template has included and inserted all of the splice points by comparing it with all the traces in the span.

NOTE: If the template is missing any splice locations, try the following:

- 1) Decrease **Min. Frequency**.
- 2) Verify **Number of splices** is high enough to include all the events; if not increase the number of splices and re-run smart Template.
- 3) If necessary manually insert missing events.
- 4) Insert new events on the template trace.
 - a. If a splice event is not reported, the event must be inserted.
 - b. Insert the event by placing the A-Cursor on the center of the splice location.
 - c. Double click on any event for the primary trace to view the event window.
 - d. Click the **Event Window's Insert** button.
 - e. Set the LSA cursors for this newly created event.



- f. Select **SPICE LOSS MODE** from the top of the screen grid display.
 - g. Using the left mouse button, double-click on a splice event.
 - h. Select **VIEW / DISPLAY FROM A** to allow zooming-in on the trace events.
 - i. Use the slider bars to expand around the A-Cursor and zoom in on the first trace event.
- 5) Click the **Event Window's** >> and << buttons until the A-Cursor is centered on the first event on the trace waveform.
 - 6) Set the LSA Highlights for each event using the [L L L] and [R R R] screen icons or by left clicking on a hash mark and dragging with your mouse. Hint: There are two LSA Highlights. One LSA Highlight should be placed on the left side of the splice event. The other should be placed to the right side of the event. Each LSA highlight should encompass as much of the fiber span as possible on each side of the event however, the end of each LSA highlight, denoted by a vertical hash mark (I), should not touch the splice event as shown above.
 - 7) Be sure to select **EDIT / PASTE / OK** after setting the LSA cursors for each event.

Edit Event 1 ST Guilwgr.006

Type: **Non-Reflective**

Distance: to m

Loss: dB Saturated

Reflectance: dB

Comment

Lat: Long:

- F. When finished, save the Template. Select **TRACE / SAVE AS** to save the template. Save the template under the same name and to the same directory as before. (**STXXXXYYY.trc**. Save to the same directory as the trace files in the current trace list).

NOTE: Do not re-run the analysis software on the template trace once it has been selected as the template trace.

14. APPLY THE SPLICE TEMPLATE. When the template is complete, it must be applied to the trace files in one direction for a given wavelength. This must be done in order to generate the One-Direction Splice Loss Summary Report, Bi-directional Splice Loss Summary or the Bi-directional Splice Loss Report.

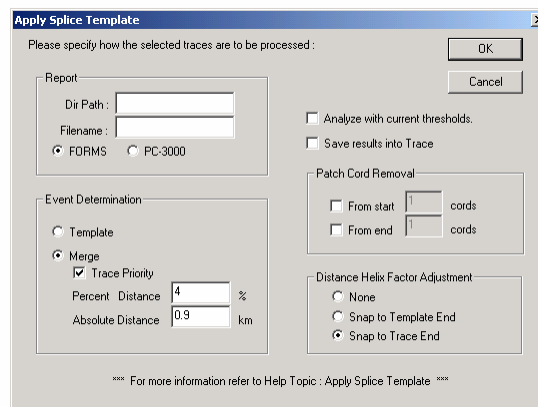
- A. Highlight all of the fibers to which the template will be applied. **Do not** highlight the Template Trace (**STXXXXYYY.trc**) at this time.

- B. Select **TRACE / APPLY SPLICE TEMPLATE**

- 1) Select Merge w/Trace Priority.
- 2) Select 4% distance correlation or .9km.

HINT: If there are two splices located near each other, take the distance between them and divide this distance by two. Then use this value for the distance correlation.

- 3) Select Snap to Trace End.
- 4) Select Remove One (1) Patchcord if one was used and not previously removed.
- 5) **DO NOT** select SAVE RESULTS to trace yet. In this way, we can make ‘test runs’ of the Splice Template to ensure that the template is compatible with the target traces.



- C. Reconcile any error messages that appear.
- 1) Make a note of the trace name and fiber distance noted in the error message window.
 - 2) Select CANCEL at the error window.
 - 3) Display only the problem trace and the template trace on the screen display.
 - 4) Zoom-in on the event noted in the error window.
 - 5) Adjust the template LSA Cursors such that they do not over-lap events on the target trace as identified in the error message.
 - 6) Be sure to select **EDIT / PASTE / OK**, after adjusting the LSA cursor settings for each overlapping splice event.

NOTE: Regarding the files from which we removed the analysis: errors are acceptable.

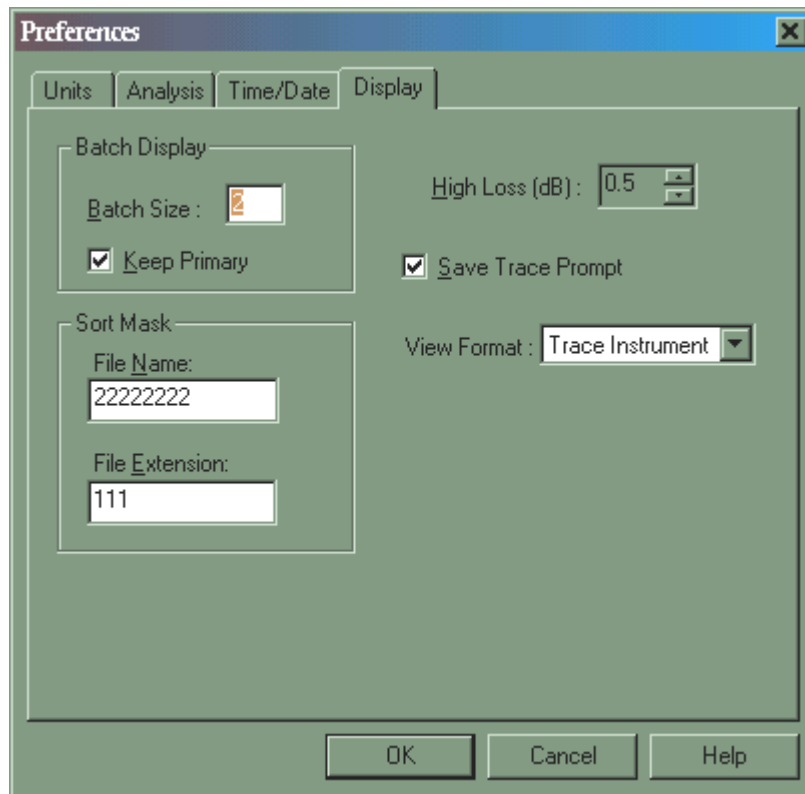
- D. After all errors have been cleared, repeat the **TRACE / APPLY SPLICE TEMPLATE** step, but be sure to select **SAVE RESULTS** to trace this time.

15. AFTER THE TEMPLATE HAS BEEN APPLIED, REMOVE THE ANALYSIS FROM ANY BROKEN OR PROBLEM FILES. This will leave a blank line on the Uni- or Bi- Directional Reports for this fiber as an alternative to erroneous values. Select **TRACE / BATCH PROCESS / REMOVE ANALYSIS / SAVE TRACE** as *Original*.

16. REPEAT STEPS 2 THROUGH 16 FOR THE TRACES AT THE SAME WAVELENGTH IN THE OTHER DIRECTION.

17. ONCE A TEMPLATE FOR EACH DIRECTION FOR A GIVEN WAVELENGTH HAS BEEN APPLIED, GENERATE A BI-DIRECTIONAL REPORT. To generate the report:

- A. Create a new trace list in the cable directory, for example *Bi-directional Traces 1550*.
- B. Add to this trace list, all of the traces in both directions plus both newly created templates.
- C. Using the sort mask, arrange the traces so that they are grouped by their extensions.



Select **FILE / PREFERENCES / DISPLAY** and try the sort mask as shown. The values for the File Name and Extension may be changed as needed such that the traces are listed back to back for both directions (ex. XXXYYY15.001, YYYXXX15.001, XXXYYY15.002, YYYXXX15.002, ETC).

- D. Display and make primary the first template in the tracelist, highlight all traces on which to run the report. In addition, deselect the templates as they do not need to be reported on.
- E. Select **FILE / PRINT PREVIEW / REPORT / OK (REPORT TYPE)** and enter the appropriate header information, filename convention as described in (7A), etc., then select **OK**.
- F. Review the report for proper results and investigate all events that appear erroneous.
- G. If acceptable, select **FILE / PRINT / REPORT / OK (REPORT TYPE) / OK**.
REPEAT STEPS 2-18 FOR THE ALTERNATIVE WAVELENGTH IF DESIRED.

Conclusion

This application note provides step-by-step instruction for the user to: create a new trace list, display selected traces – as well as set and utilize the analysis thresholds to run the Fiber Analysis Software (FAS). It expands on the current content found in the software’s “Help” menu. In addition, it documented the steps to use Smart Template, a feature which simplifies the creation of a trace template.



Specifications are subject to change without notice.

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