

Networks (1.16)

SpliceLoss Template and Report Generation Procedure

Networks Version 1.16 and later

Introduction

This application note is targeted at field service personnel who wish to fully maximize the application of NetWorks 1.16 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 and utilize the analysis thresholds to run the Fiber Analysis Software (FAS selection). 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 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.

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.

Guide to Using Networks Powernet (1.16) Software

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

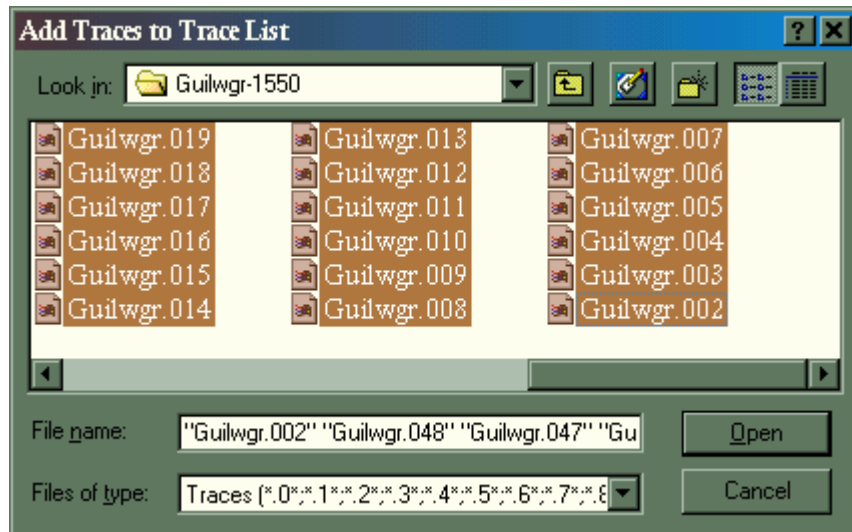
NOTE: It is best to work with copies of the traces as some functions are not reversible.

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.

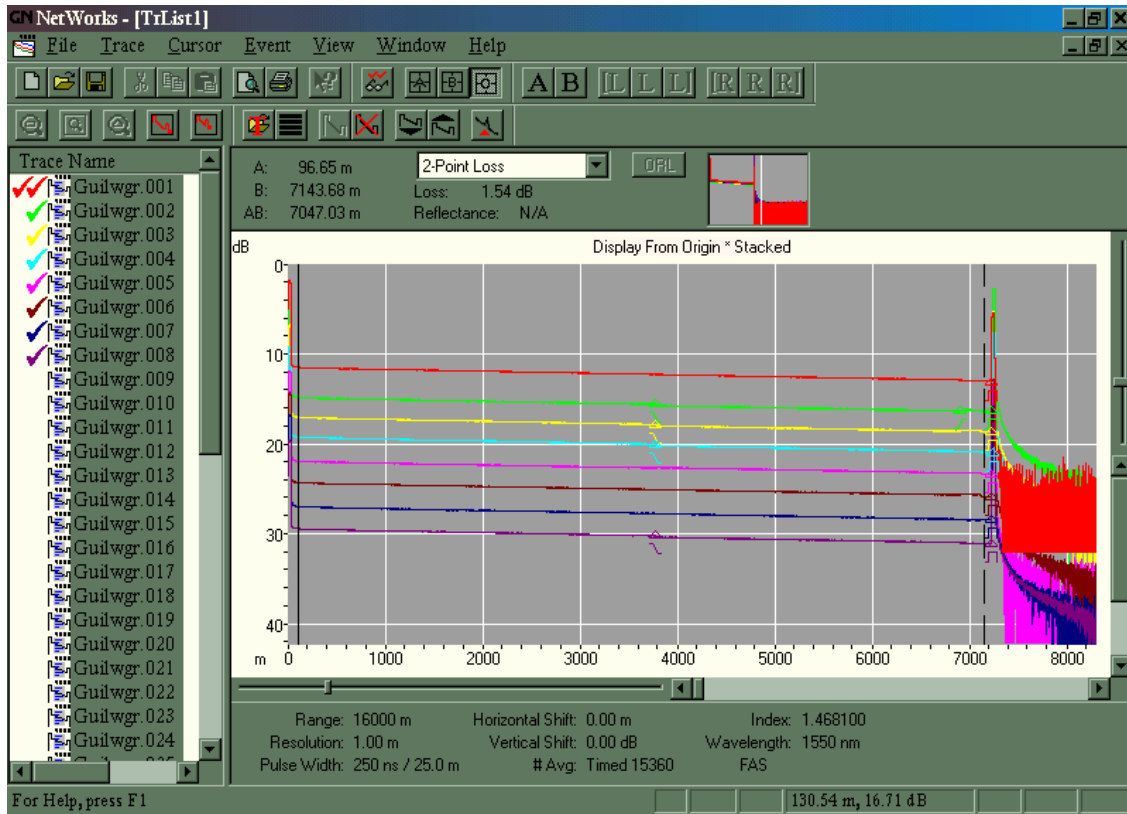


NOTE: If some or all of the traces are not shown, change the FILES OF TYPE to ALL FILES.

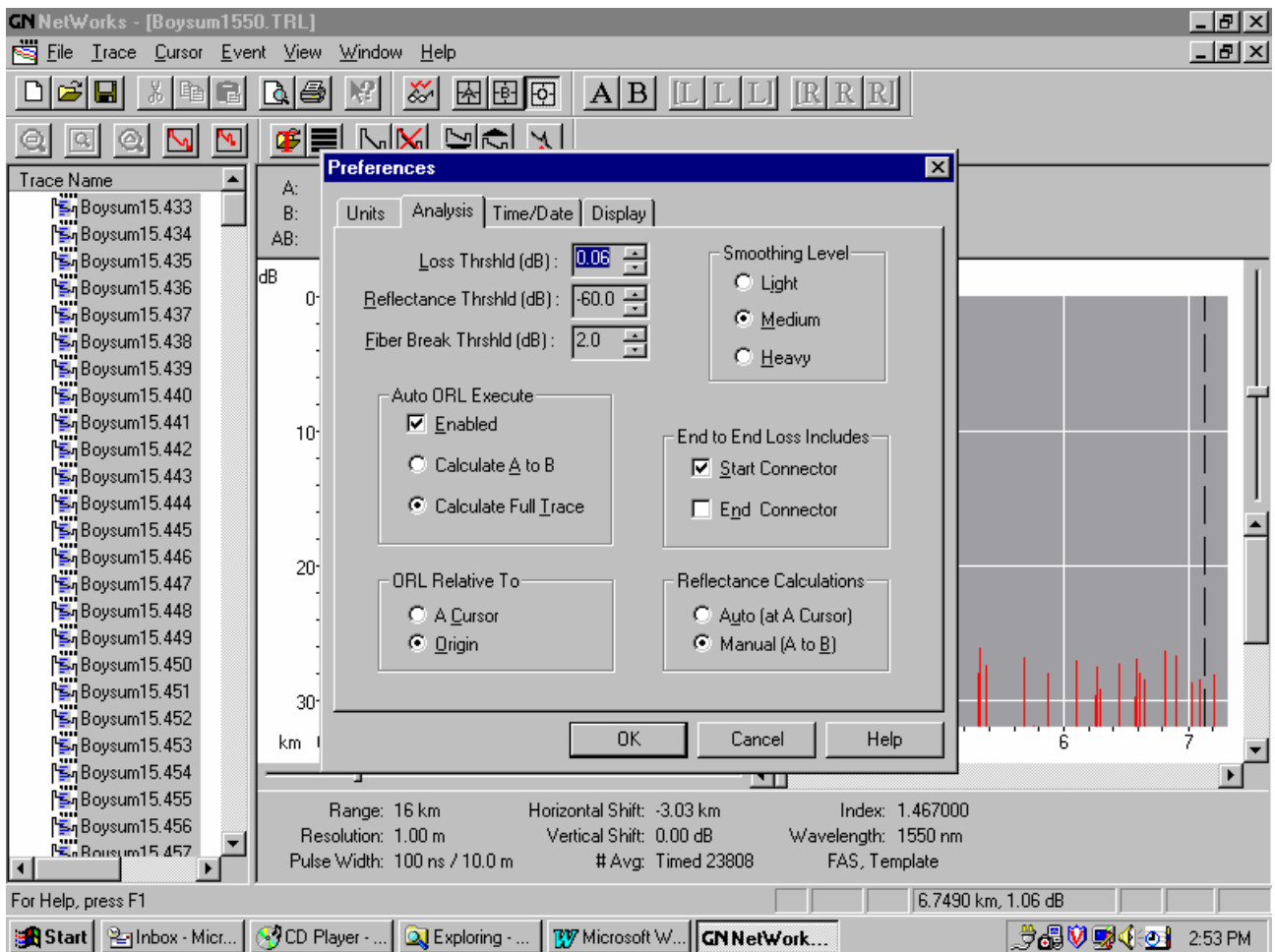
- F. Highlight all traces to add to the trace list (highlight the first trace, hold the SHIFT Key Down, then click on the last trace). This will select all traces at once.
- G. Click **OPEN** to add these traces to the trace list.

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).** To set fiber analysis thresholds select **FILE / PREFERENCES / ANALYSIS**, then 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. The remaining parameters are not significant at this time.
 - Click **OK**.
- NOTE:* These values can be changed as needed.

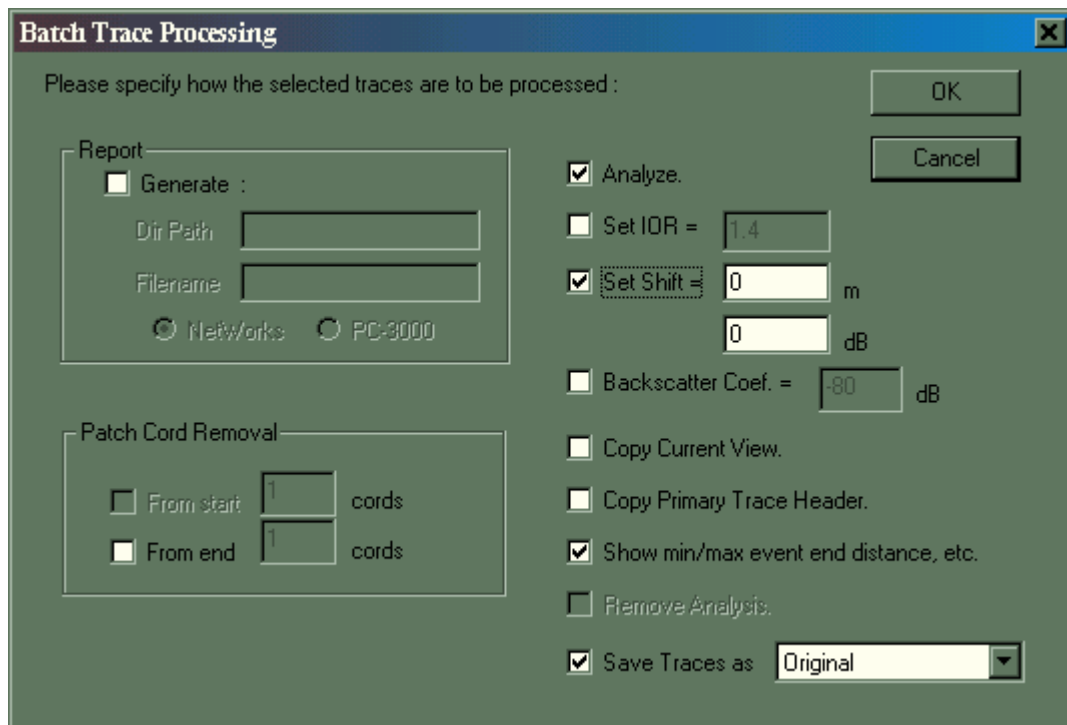


- Select the traces to process (highlight the first trace, hold the SHIFT Key Down, then click on the last trace).

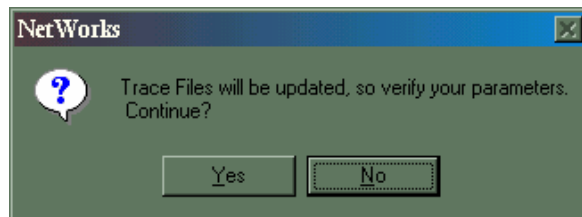
5. **BATCH PROCESS ALL TRACES TO RESET THE APPLICABLE PARAMETERS TO THE SAME SETTINGS.** Select TRACE / BATCH PROCESS to begin and generate the min/max listings.

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 determines which trace might best represent the number of true events. This will be useful in selection of a Template Trace in a later step.

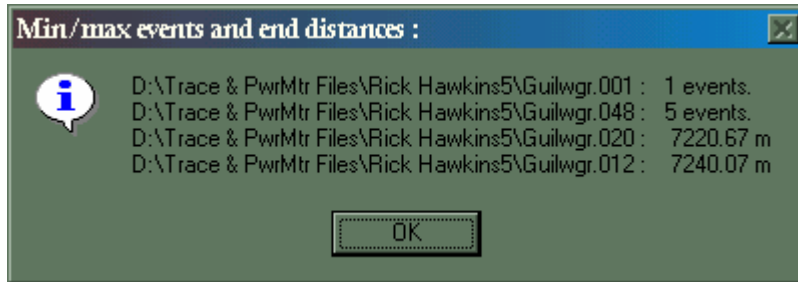
- A. Check (✓) *Analyze.*
- B. Change the IOR to the correct value, if change is required.
- C. Check (✓) *Set Shift = 0(zero) meters, 0(zero) dB.*
- D. Check (✓) *Show min/max event end distance, etc.*
- E. Check (✓) *Save Traces as Original.*
- F. Click **OK**.



- G. 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.



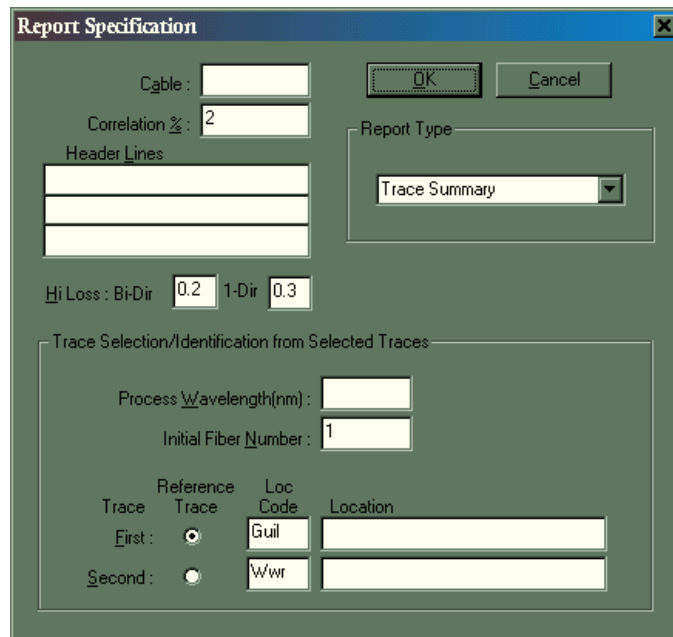
- A. Make a note of the trace which displays the max number of events and correct end distance.
 B. Click **OK** when finished.

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 to ensure consistency in comparison. 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. The remaining sections can be filled in and used as documentation.
 B. 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 Distance Range and Resolution, # of Averages, 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 # 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, then 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.

NetWorks - [TrList2]

Trace Summary Report

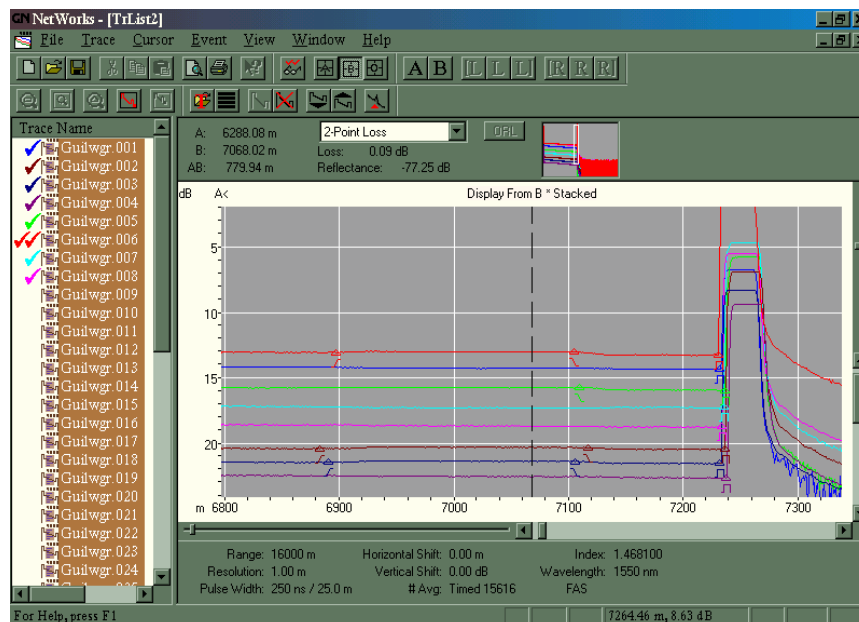
Cable : Guil <-> Vwr
Trace List : TrList2
01/11/00

Trace	Wave-length (nm)	Range (m)	Pulse Width (nsec)	Reso (m)	# Avgs	Date	Time	Instrument	Optics Module	Fiber Type
Guilwgr.001	1550	16000	250	1.00	15360	12/16/99	02:33 PM	CMA4000	CM4456	Singlemode
Guilwgr.002	1550	16000	250	1.00	15872	12/16/99	02:36 PM	CMA4000	CM4456	Singlemode
Guilwgr.003	1550	16000	250	1.00	15872	12/16/99	02:40 PM	CMA4000	CM4456	Singlemode
Guilwgr.004	1550	16000	250	1.00	15616	12/16/99	02:44 PM	CMA4000	CM4456	Singlemode
Guilwgr.005	1550	16000	250	1.00	15872	12/16/99	02:53 PM	CMA4000	CM4456	Singlemode
Guilwgr.006	1550	16000	250	1.00	15616	12/16/99	03:12 PM	CMA4000	CM4456	Singlemode
Guilwgr.007	1550	16000	250	1.00	15872	12/16/99	03:15 PM	CMA4000	CM4456	Singlemode
Guilwgr.008	1550	16000	250	1.00	15616	12/16/99	03:23 PM	CMA4000	CM4456	Singlemode
Guilwgr.009	1550	16000	250	1.00	15616	12/16/99	03:25 PM	CMA4000	CM4456	Singlemode
Guilwgr.010	1550	16000	250	1.00	15872	12/16/99	03:29 PM	CMA4000	CM4456	Singlemode
Guilwgr.011	1550	16000	250	1.00	15360	12/16/99	03:31 PM	CMA4000	CM4456	Singlemode
Guilwgr.012	1550	16000	250	1.00	15872	12/16/99	03:34 PM	CMA4000	CM4456	Singlemode
Guilwgr.013	1550	16000	250	1.00	15872	12/16/99	03:42 PM	CMA4000	CM4456	Singlemode
Guilwgr.014	1550	16000	250	1.00	15616	12/16/99	03:45 PM	CMA4000	CM4456	Singlemode
Guilwgr.015	1550	16000	250	1.00	15872	12/16/99	03:51 PM	CMA4000	CM4456	Singlemode
Guilwgr.016	1550	16000	250	1.00	15616	12/16/99	03:53 PM	CMA4000	CM4456	Singlemode
Guilwgr.017	1550	16000	250	1.00	15872	12/16/99	03:56 PM	CMA4000	CM4456	Singlemode
Guilwgr.018	1550	16000	250	1.00	15872	12/16/99	03:59 PM	CMA4000	CM4456	Singlemode
Guilwgr.019	1550	16000	250	1.00	15872	12/16/99	04:01 PM	CMA4000	CM4456	Singlemode

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6922.74 m, 1.55 4B

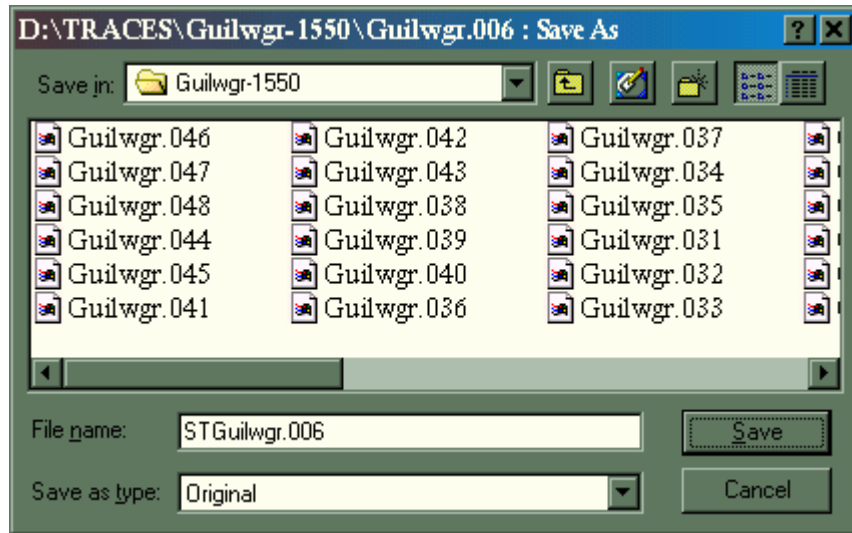
10. **ONCE ALL TRACES ARE ACCOUNTED FOR AND "FIXED", SELECT A TRACE TO USE AS THE TEMPLATE.** Choose and display the trace noted in step 6A with the correct end length and the most "true" or known events. This will become the Template trace.
- Make it the Primary Trace (signified by two red check marks in the trace list) by right clicking and choosing PRIMARY. Display seven additional traces to get a feel for where the events are located and verify that all the events in the primary trace are real.
 - Stack the traces for easier viewing by selecting VIEW/STACK. STACK should be checked (✓).
 - SELECT FILE, PREFERENCES, DISPLAY, check (✓) the box to **Keep Primary**.



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

A. Left-Mouse click to highlight the trace just selected to be the Template Trace.

B. Select **TRACE / SAVE AS / STXXXXYYY.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.

B. Select **TRACE / ADD** to open the ADD TRACES TO TRACE LIST window.

C. Select the Directory containing the new Template trace file.

D. Highlight the Template Trace to add to the trace list.

E. Click **OPEN** to add this trace to the trace list.

F. Once in the Trace List, left-mouse click on the selected trace.

G. Select **TRACE / DISPLAY** to display the trace.

H. Right-mouse click on the selected trace.

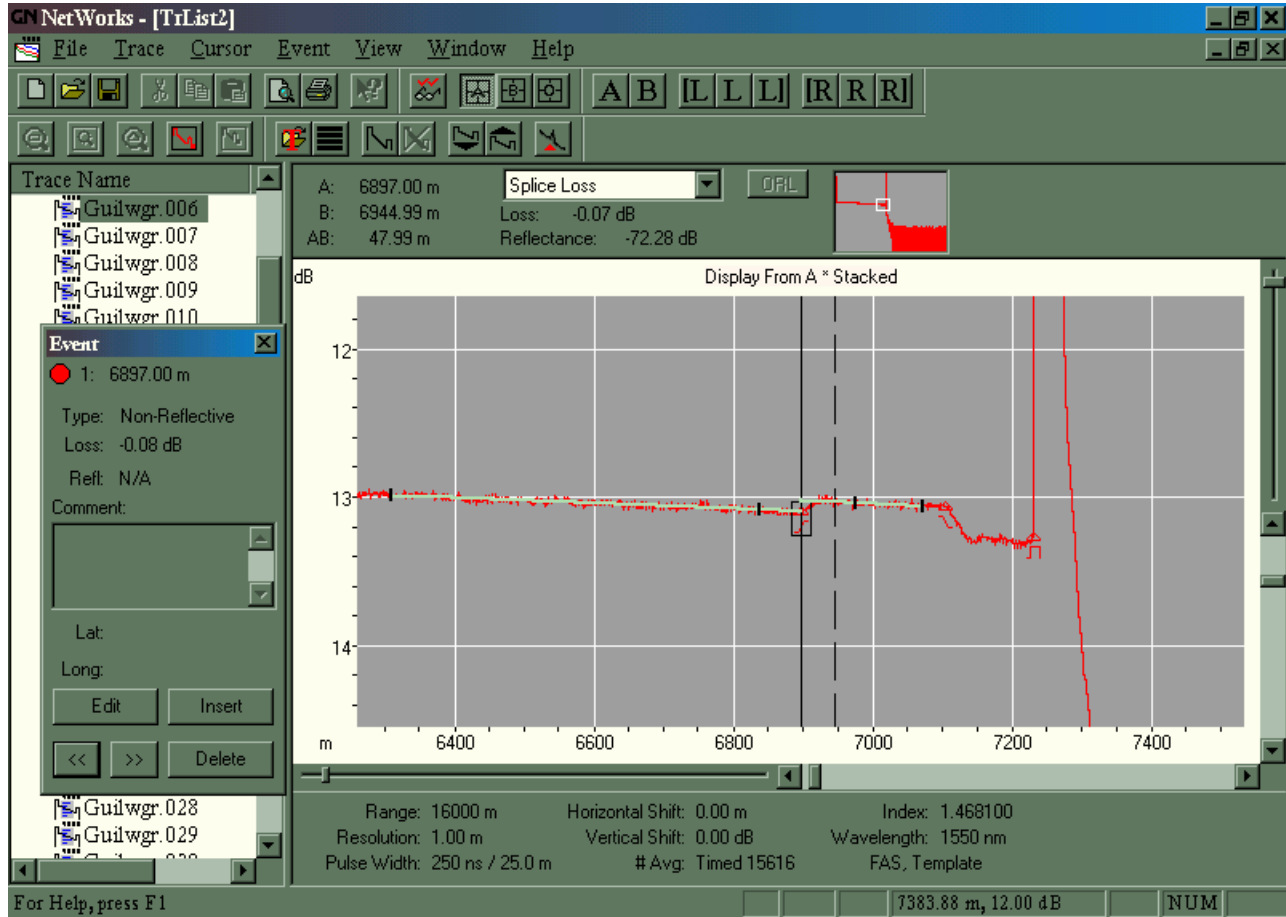
I. Make it the *primary* trace.

13. BUILD A SPLICE TEMPLATE FOR THE TRACES IN ONE DIRECTION FOR ONE WAVELENGTH.

HINT: Display other traces and use them as guides when setting LSA cursors.

A. SET EVENT LOSS LSA HIGHLIGHTS ON THE TEMPLATE TRACE.

- 1) With the newly saved Template trace *STXXXXYYY.trc* highlighted and displayed as the primary trace, select **TRACE / BUILD SPLICE TEMPLATE** (“**Template**” will appear at the bottom of the trace display window).

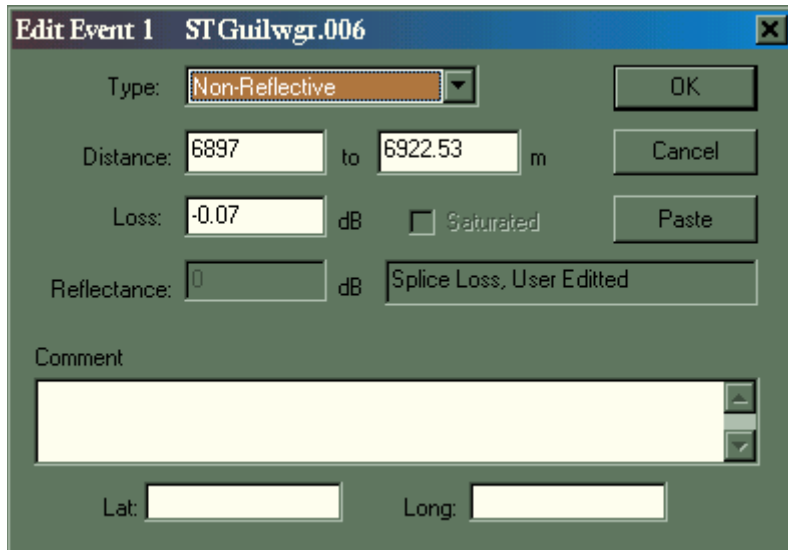


NOTE: Do not re-run the analysis software on the template trace once it has been selected as the template trace.

- 2) Select **SPLICE LOSS MODE** from the top of the screen grid display.
- 3) Using the left mouse button, double-click on a splice event.
- 4) Select **VIEW / DISPLAY FROM A** to allow zooming-in on the trace events.
- 5) Use the slider bars to expand around the A-Cursor and zoom in on the first trace event.
- 6) Click the **Event Window's** >> and << buttons until the A-Cursor is centered on the first event on the trace waveform.
- 7) 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 (l), should not touch the splice event as shown above.

- 8) Once the LSA highlights have been placed for the first event, select the **Event Window's EDIT / PASTE / OK.**

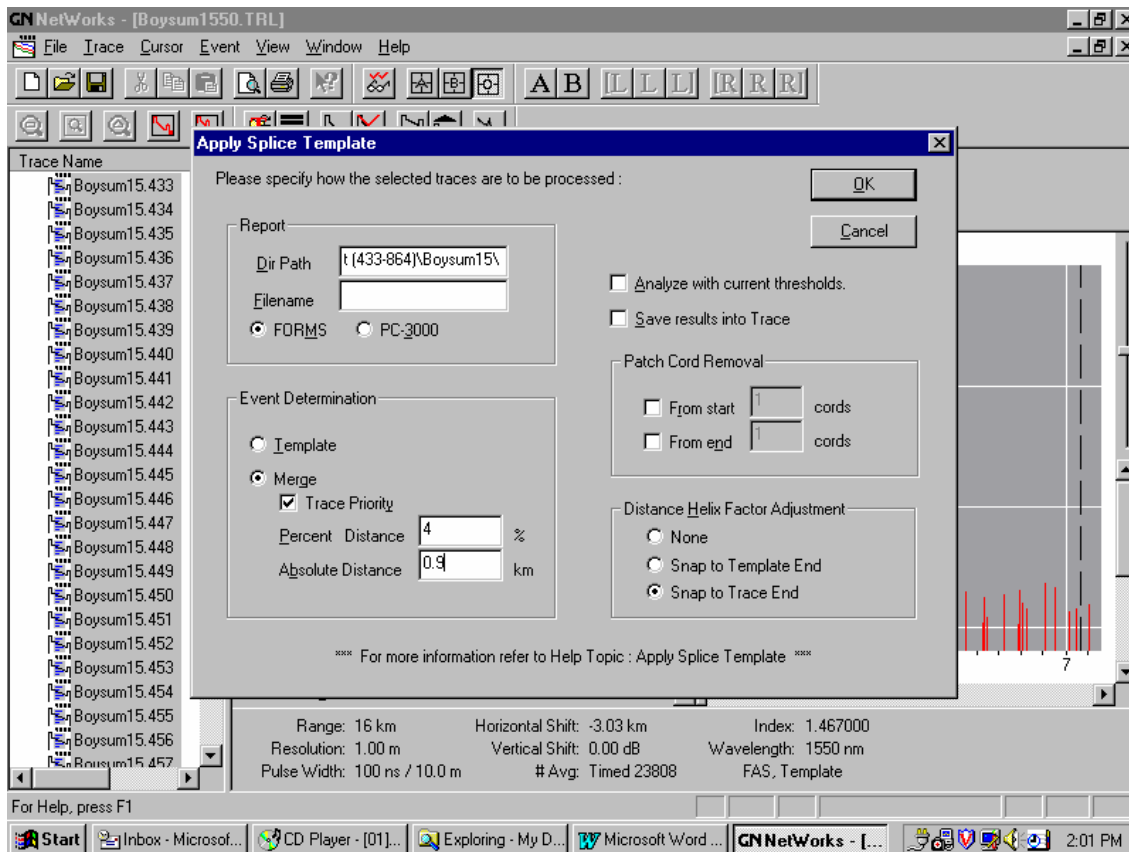


B. INSERT NEW EVENTS ON THE TEMPLATE TRACE.

- 1) If a splice event is not reported, the event must be inserted.
- 2) Insert the event by placing the A-Cursor on the center of the splice location.
- 3) Double click on any event for the primary trace to view the event window.
- 4) Click the **Event** Window's **Insert** button.
- 5) Set the LSA cursors for this newly created event.
- 6) Select **EDIT / PASTE / OK** to store the cursor locations.
- 7) Set the LSA cursors for the rest of the events on the template.
- 8) Be sure to select **EDIT / PASTE / OK** after setting the LSA cursors for each event.
- 9) When finished, save the Template.
- 10) Select **TRACE / SAVE AS** to save the template. Save the template under the same name and to the same directory as before.

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**
- C. Select Merge w/Trace Priority.
- D. Select 4% distance correlation or .9km.
- E. *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.
- F. Select Snap To Trace End.
- G. Select Remove One (1) Patchcord if one was used and not previously removed.
- H. 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.



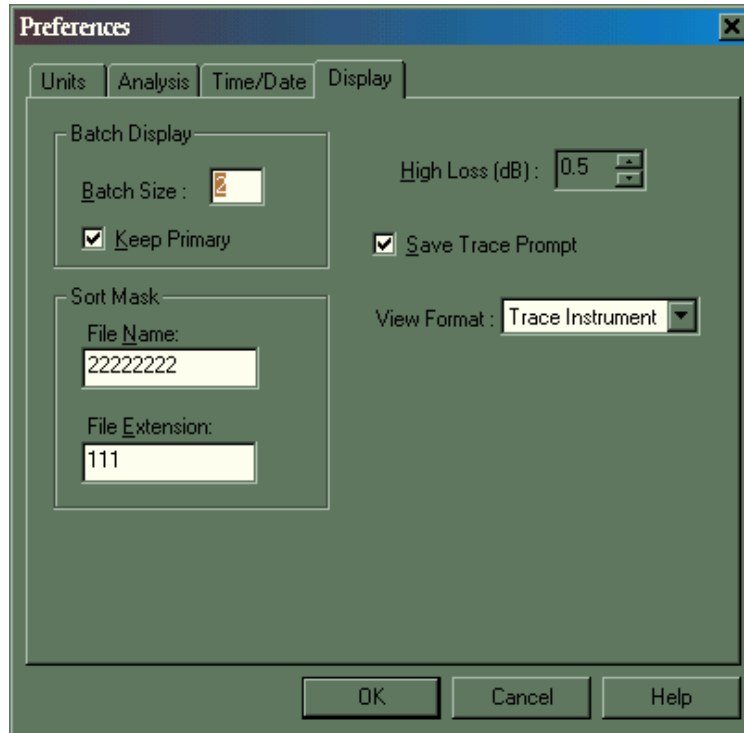
- I. Reconcile any error messages that appear.
 - J. Make a note of the trace name and fiber distance noted in the error message window.
 - K. Select CANCEL at the error window.
 - L. Display only this trace and the template trace on the screen display.
 - M. Zoom-in on the event noted in the error window.
 - N. Adjust the LSA Cursors such that they do not over-lap events on the target trace as identified in the error message.
 - O. Be sure to select **EDIT / PASTE / OK**, after adjusting the LSA cursor settings for each overlapping splice event.
- NOTE: Errors are acceptable for the files from which we removed the analysis .*
- P. After all errors have been cleared, repeat the **TRACE / APPLY 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. ADD PLACEHOLDER TRACES FOR ANY MISSING FILES BY COPYING AN ARBITRARY EXISTING TRACE AND REMOVING THE ANALYSIS.** This will enter a blank line in the reports for this trace.
- A. Highlight any trace in the list and choose **TRACE/SAVE AS**. Name the trace such that the fiber number corresponds to the missing file and click **SAVE**. Repeat this process if other traces are missing.
 - B. Add these newly created traces to the trace list by choosing **TRACE/ADD**, highlighting the file(s) and **OPEN**.
 - C. Highlight the newly created placeholder trace(s).
 - D. Select **TRACE / BATCH PROCESS / REMOVE ANALYSIS / SAVE TRACE AS Original.**

17. REPEAT THE STEPS 2 THROUGH 16 FOR THE TRACES AT THE SAME WAVELENGTH IN THE OTHER DIRECTION. ONCE A TEMPLATE FOR EACH DIRECTION FOR A GIVEN WAVELENGTH HAS BEEN APPLIED, ABIDIRECTIONAL REPORT CAN BE GENERATED. 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. Use the sort mask to arrange the traces, so that they are grouped by their extensions.
 - D. Select **FILE / PREFERENCES / DISPLAY** and try the sort mask as shown. The values for the File Name and Extension may be changed as needed so that the traces are listed back to back for both directions (ex. XXXYYY15.001, YYYXXX15.001, XXXYYY15.002, YYYXXX15.002, etc).

REPEAT STEPS 2-18 FOR THE ALTERNATIVE WAVELENGTH IF DESIRED.



Conclusion

Anritsu Company's network software emulation tool (in a Windows environment) increases the efficiency of users and, through remote testing, allows a company's equipment to remain in the field where it is needed the most. This application note is targeted at field service personnel who wish to fully maximize the application of NetWorks 1.16 for fiber traces. This document outlines step-by-step instruction for the user to: create a new trace list, display selected traces – and utilize the analysis thresholds to run the Fiber Analysis Software (FAS).

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