

Best Practices When Configuring Circuits on the ONS 15454

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Introduction

There are several best practices that Cisco recommends to follow when you configure circuits on the ONS 15454. This document uses a lab setup to demonstrate these best practices.

Note: A circuit that has lost connectivity to the end points is in an INCOMPLETE state. If you try to delete the circuit, bandwidth can be stranded. The best practice is to back out, and ensure that the Cisco Transport Controller (CTC) can see the entire network topology in order to learn the end points of the circuit, and change the circuit back to an ACTIVE state. Delete a circuit only when it is restored to the ACTIVE state. If it is not possible to get the circuit into an ACTIVE state, ensure that you delete all the incomplete segments of the circuit, and configure the circuit again.

Note: In the lab setup, a Synchronous Transport Signal-1 (STS-1) circuit is configured from Node A to Node E. The lab setup demonstrates how:

- Changes on the nodes can cause the circuit to change from the ACTIVE to INCOMPLETE state.
- You can recover the circuit back to an ACTIVE state.
- A circuit in an INCOMPLETE state that cannot be recovered needs to have all of its incomplete segments deleted while in the INCOMPLETE state.

Prerequisites

Requirements

Readers of this document should have knowledge of these topics:

- Cisco ONS 15454

Components Used

The information in this document is based on these software and hardware versions:

- Cisco ONS 15454

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, make sure that you understand the potential impact of any command.

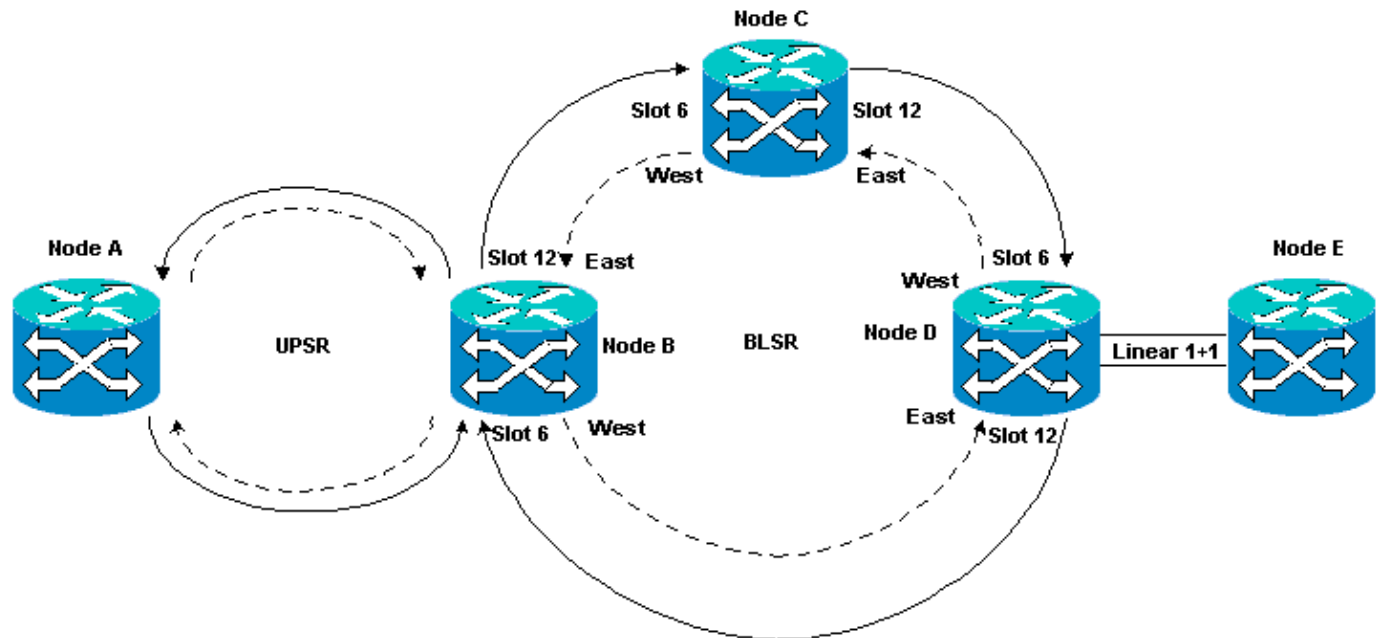
Conventions

For more information on document conventions, refer to the Cisco Technical Tips Conventions.

Background Information

This document uses this lab setup:

Figure 1 Lab Setup



Circuits are normally in the ACTIVE state. In abnormal conditions, circuits can move into an INCOMPLETE state.

Circuits can move into an INCOMPLETE state when the CTC application loses its connectivity to the end points of the circuit. The CTC application can lose connectivity when a part of the network topology is lost (unprotected fiber break), or when you add parts of the network topology, which the CTC has not previously learned.

If you try to delete circuits that are in an INCOMPLETE state, you can strand bandwidth, and cause resources to become unavailable for configuration on the 15454. The best practice is to back out, and ensure that the Cisco Transport Controller (CTC) can see the entire network topology in order to learn the end points of the circuit, and change the circuit back to an ACTIVE state. Delete a circuit only when it is restored to the ACTIVE state.

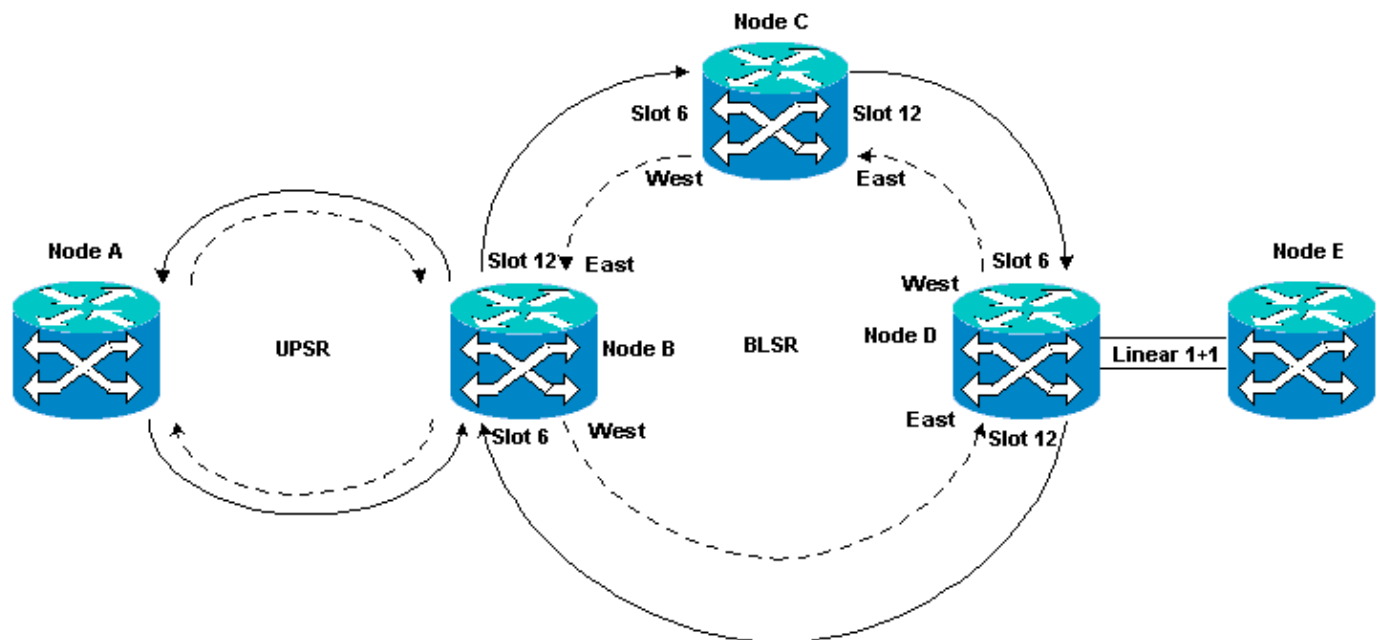
If the circuit is damaged and you are unable to get it into an ACTIVE state, ensure that you know the complete path of the circuit through the network topology. Then delete all of the incomplete segments of the circuit.

If you do not follow the best practices in certain circumstances, you can corrupt the control blocks. Control blocks instruct the circuits about which path to take through the Cross Connect (XC) and Cross Connect Virtual Tributary (XC-VT) cards. The STS and VT circuits that take these paths then become unavailable for configuration on the 15454. As a result, the bandwidth and switching capacity through the XC and XC-VT cards are reduced.

Automatically Provisioned (A to Z) Fully Protected Circuit

In the sample lab setup, a circuit is provisioned from Node A to Node E. The circuit is fully protected and automatically routed. One of the strongest features on the 15454 is A to Z provisioning. A to Z provisioning enables you to specify the source and destination ports, and allows the 15454 nodes to automatically configure the circuit.

Figure 2 Circuit is Provisioned From Node A to Node E



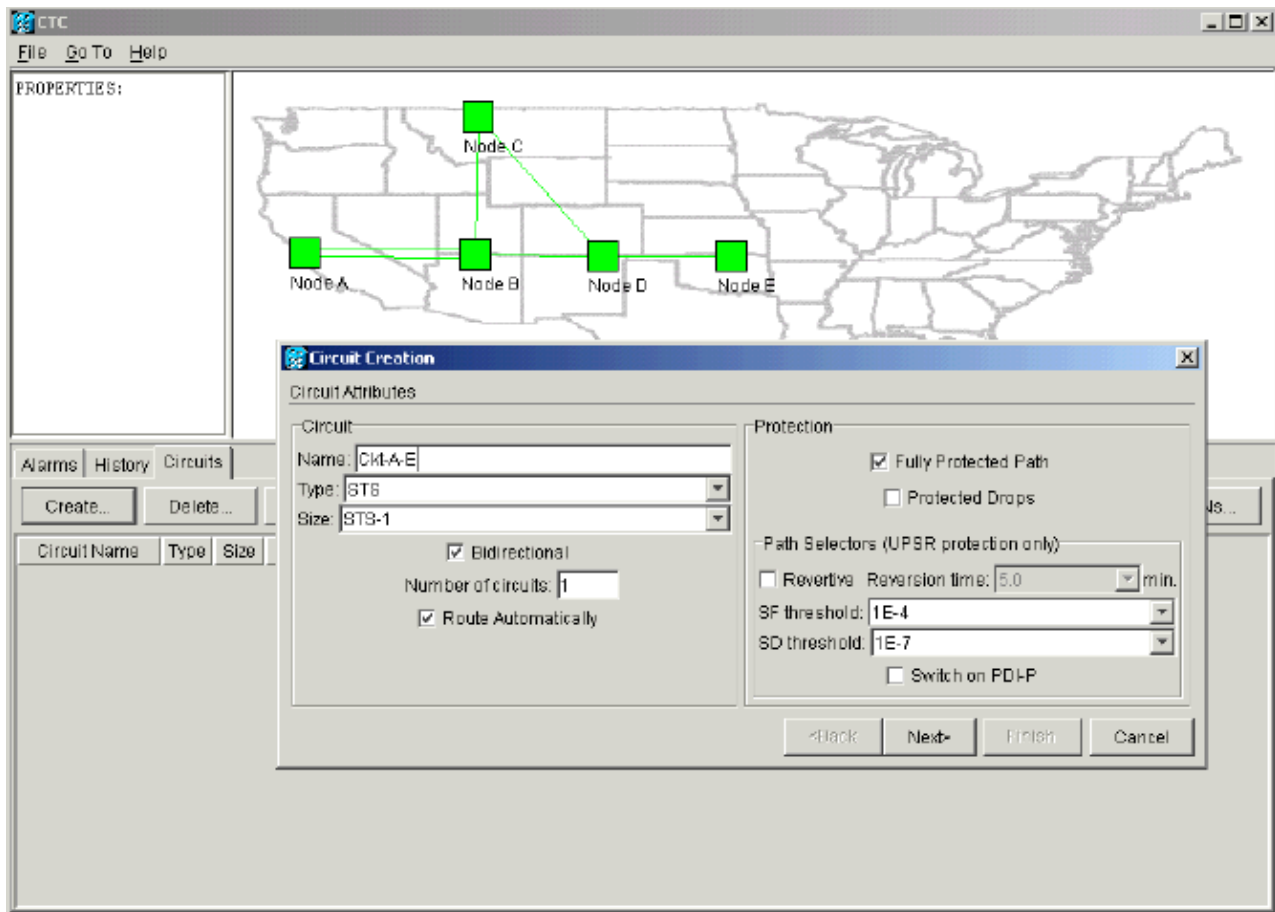
Configure an Automatically Provisioned Fully Protected Circuit

Complete these steps:

1. Select the **Circuits** tab from the network level view to create a single, bidirectional, fully protected circuit with automatic (A to Z) provisioning.
2. Click **Create**.

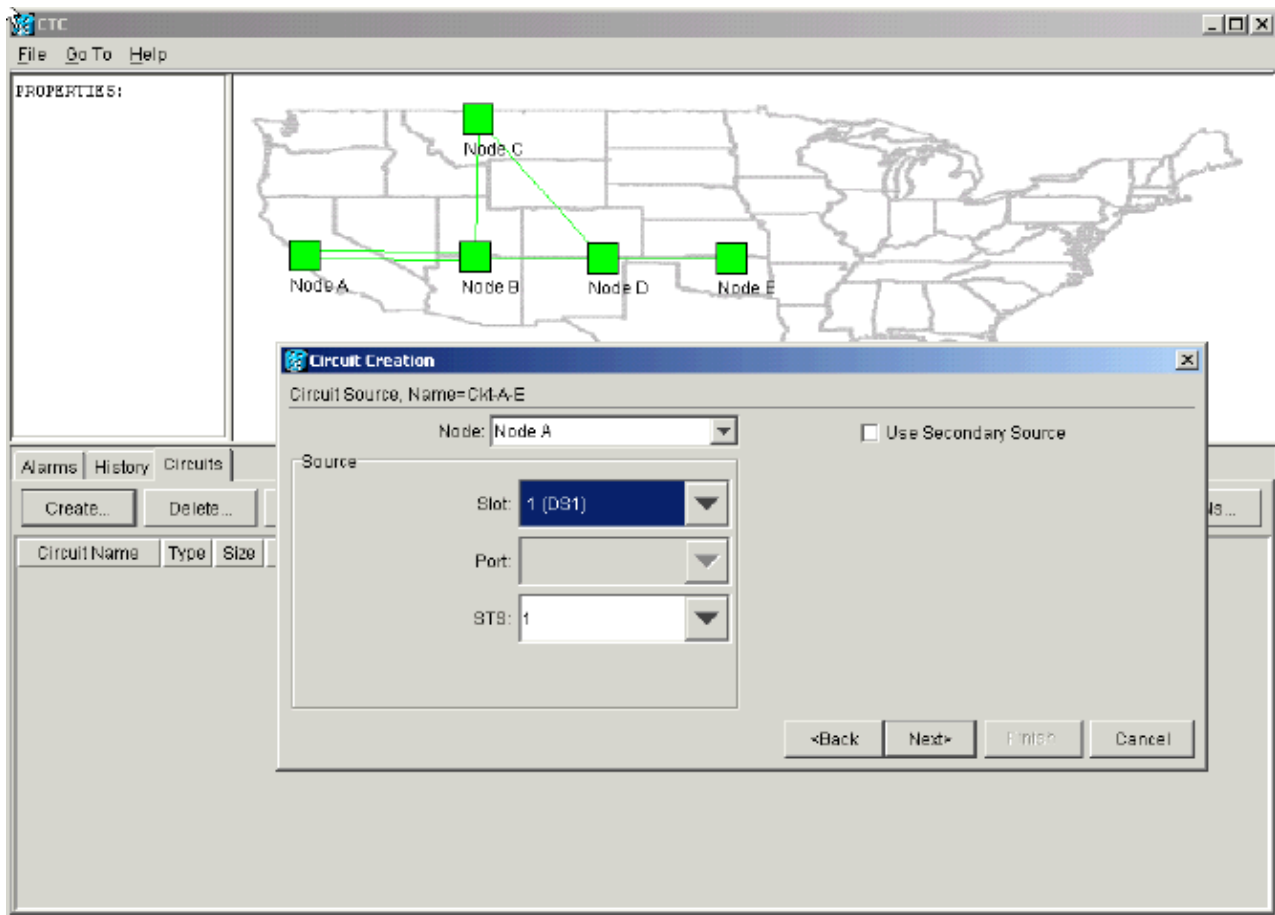
The Circuit Creation dialog box is displayed:

Figure 3 Create a Single, Bidirectional, Fully Protected Circuit with A to Z Provisioning



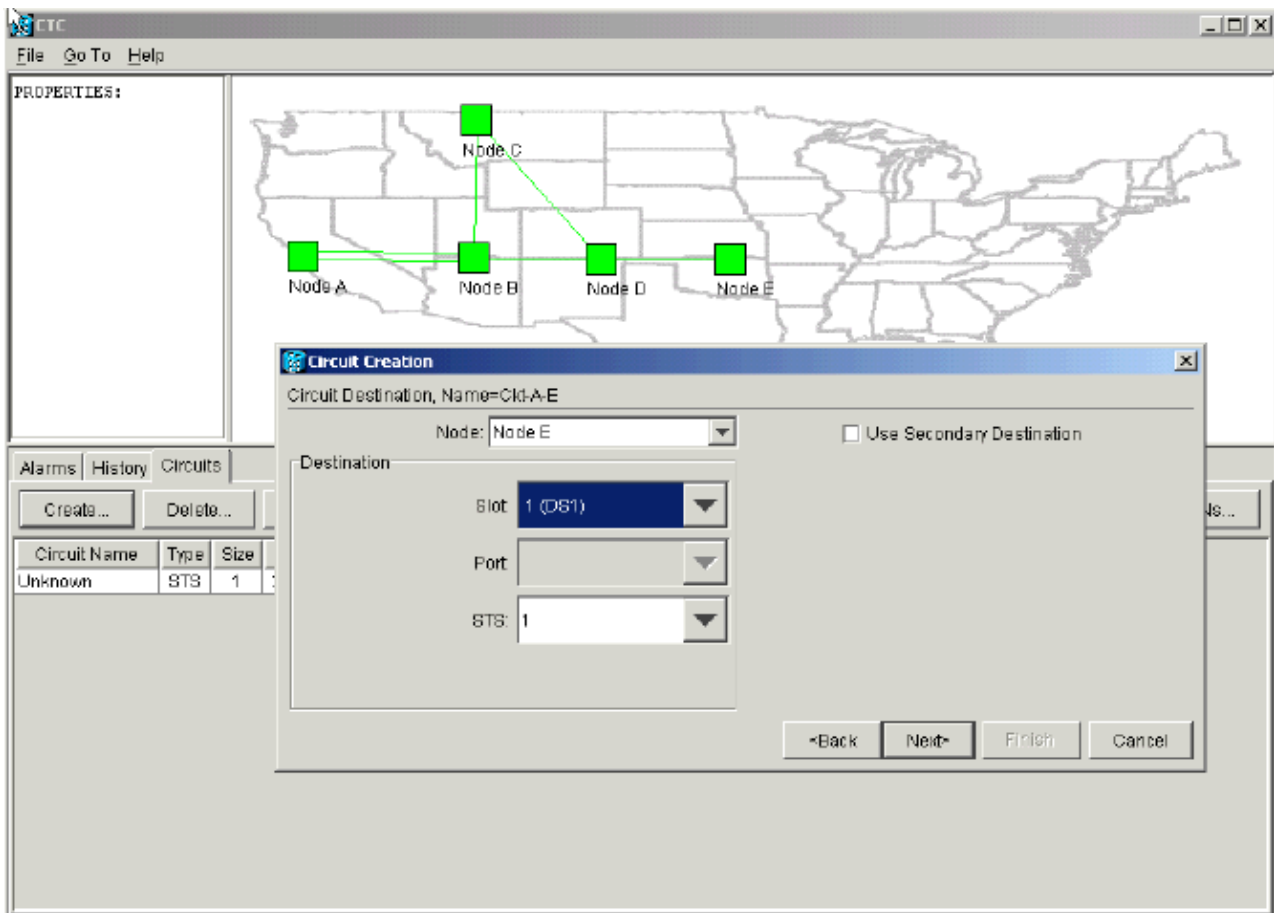
3. Specify the circuit name, type, and size in the relevant fields.
4. Click **Next**.
5. Specify the source port of the DS1 card in slot 1 of Node A to create the STS–1 circuit.

Figure 4 Specify the Source Port for the STS–1 Circuit



6. Click **Next**.
7. Specify the destination port for the STS-1 circuit as the DS1 card in slot 1 of Node E.

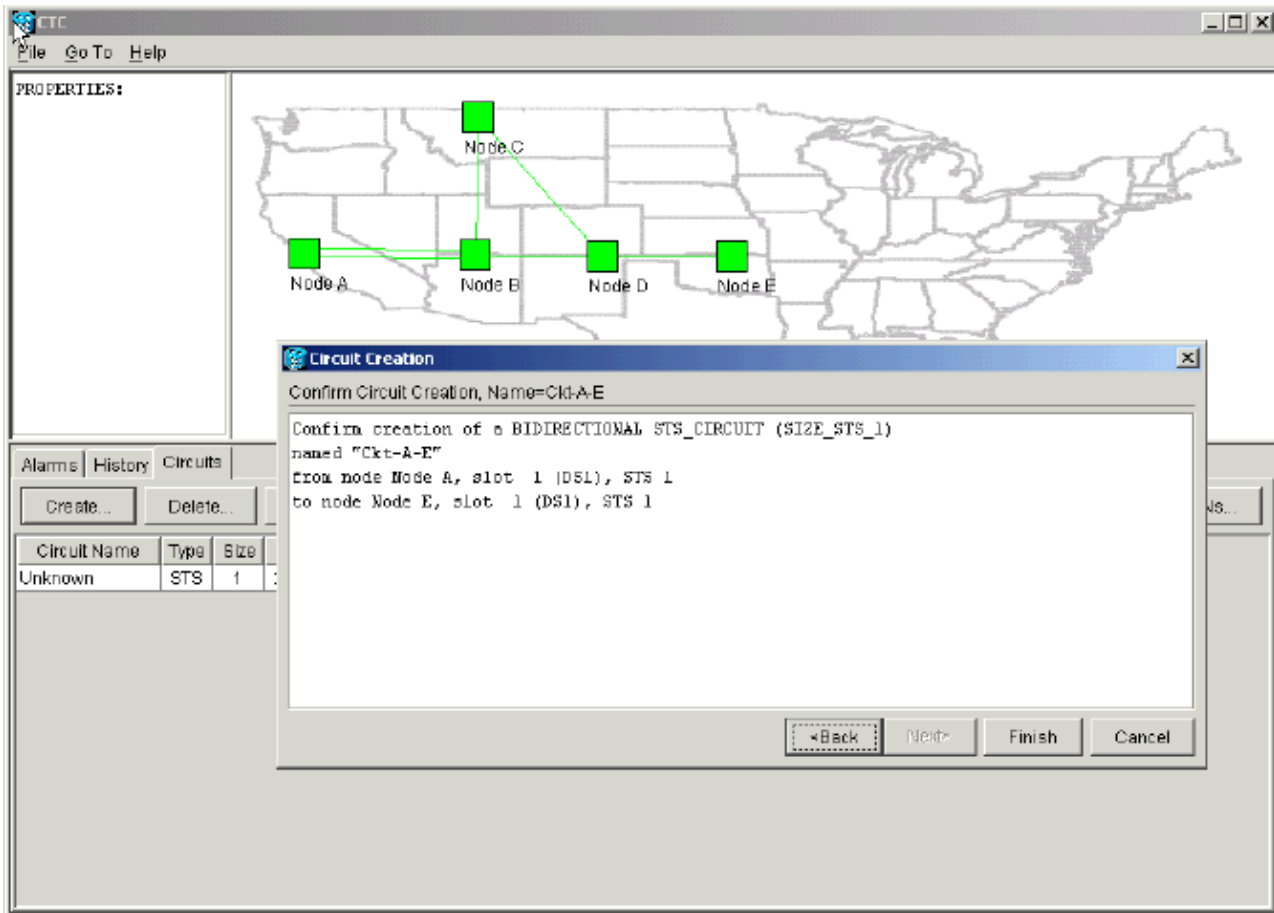
Figure 5 Specify the Destination Port for the STS-1 Circuit



8. Click **Next**.

The circuit confirmation screen prompts you to verify the source and destination ports:

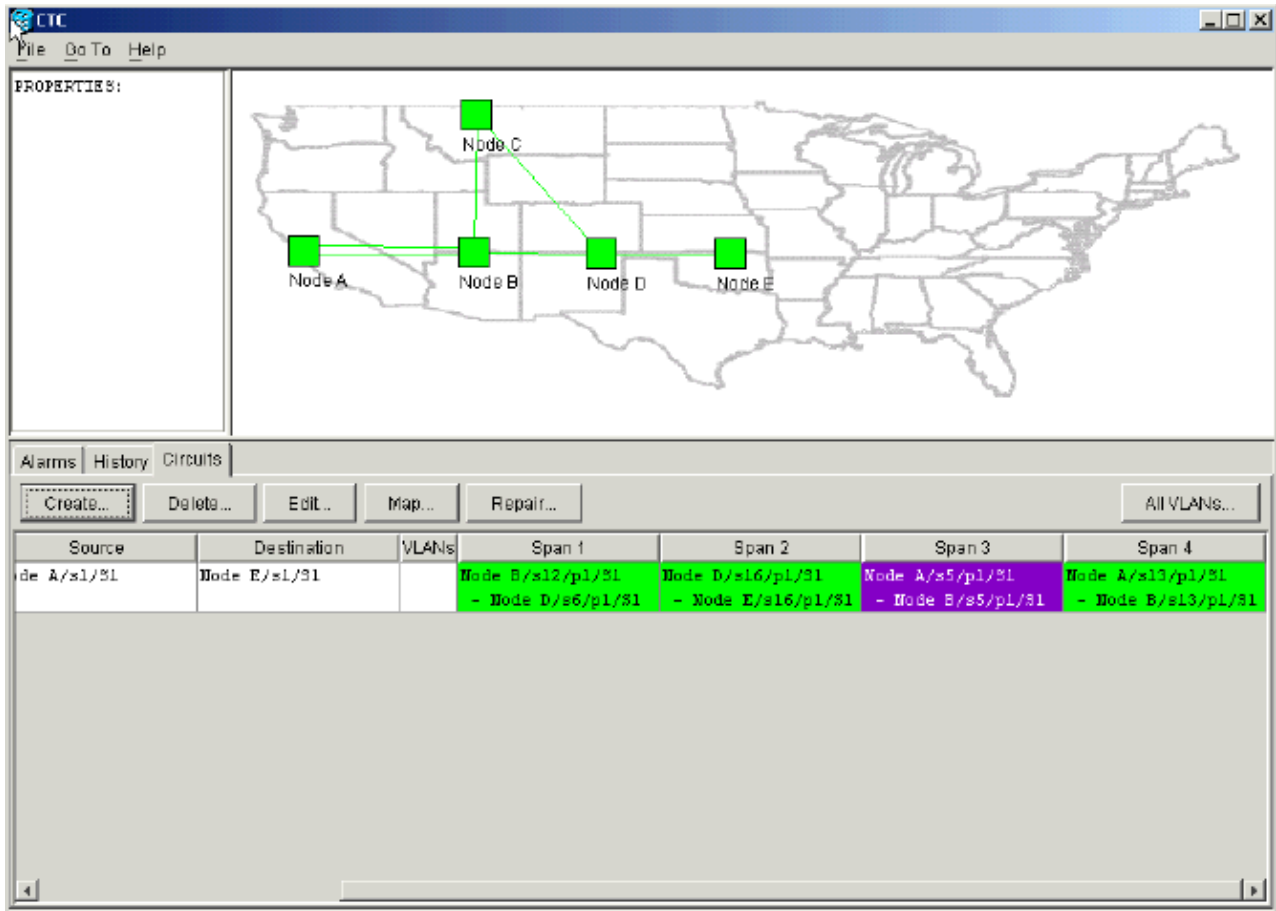
Figure 6 The Circuit Information Screen



9. Click **Finish**.

In the network level view, the right side of the newly created circuit shows the spans that the A to Z provisioning feature of the 15454 creates automatically. Notice the working and protect spans 3 and 4 for the Unidirectional Path Switched Ring (UPSR) ring from Node A to Node B:

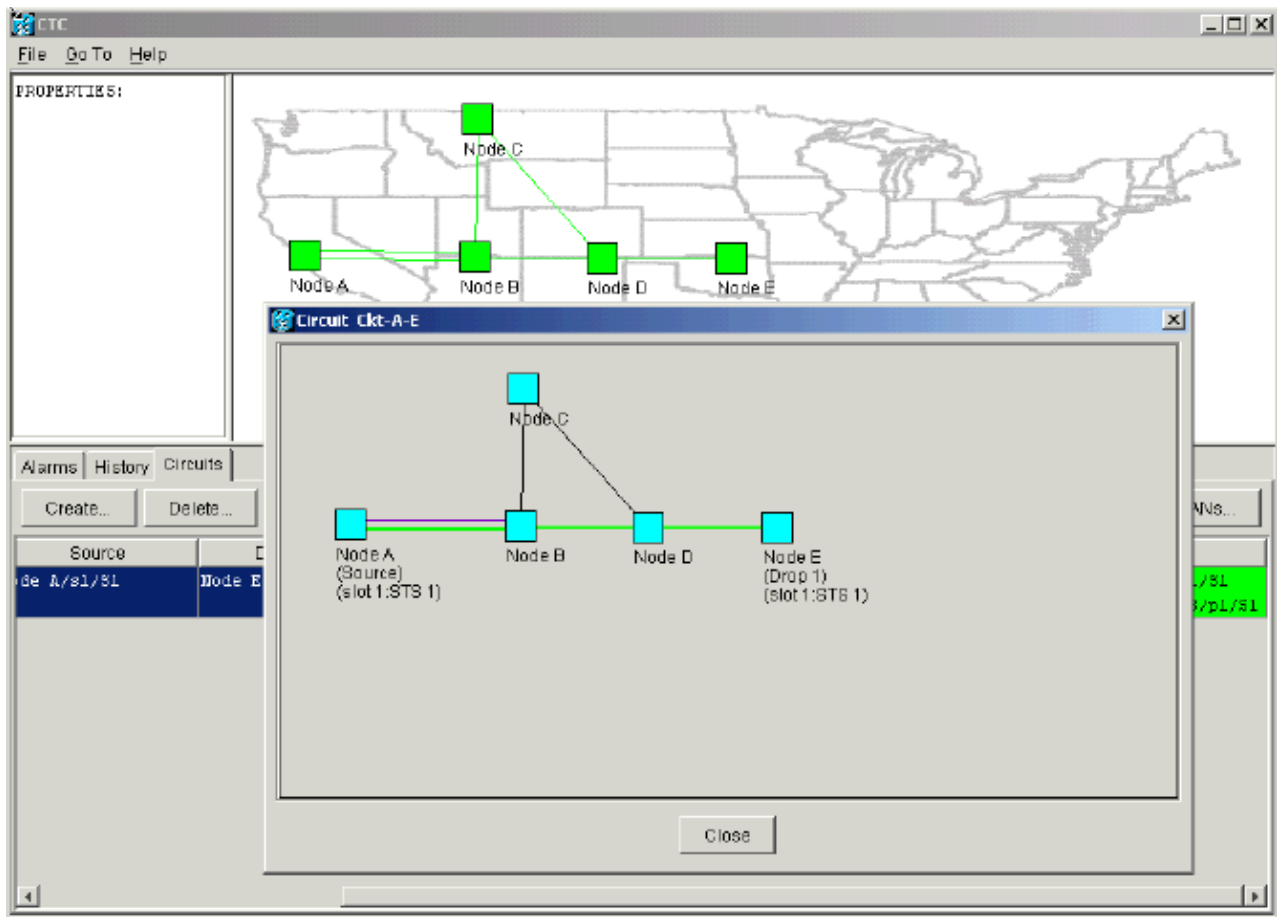
Figure 7 Spans Created by the A to Z Provisioning Feature of the 15454



10. Select **Circuit > Maps**.

The network topology displays the automatically provisioned path that the circuits take. The circuit is fully protected against a single fiber break on any span along its path:

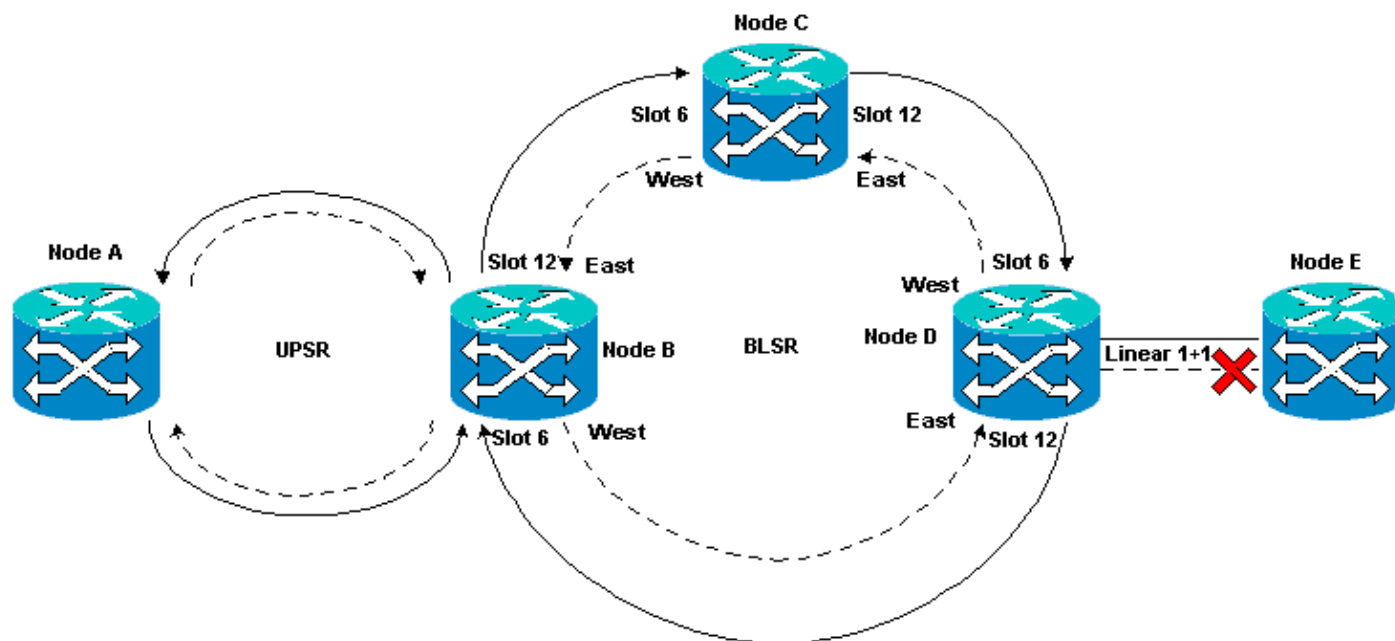
Figure 8 The Automatically Provisioned Circuits Path



Remove the Protection Path

The linear 1+1 path from Node D to Node E uses the OC-12 card in slot 16 as its working path, and the OC-12 card in slot 17 as its protection path. The protection path is deliberately removed at Node E:

Figure 9 The Protection Path is Removed at Node E

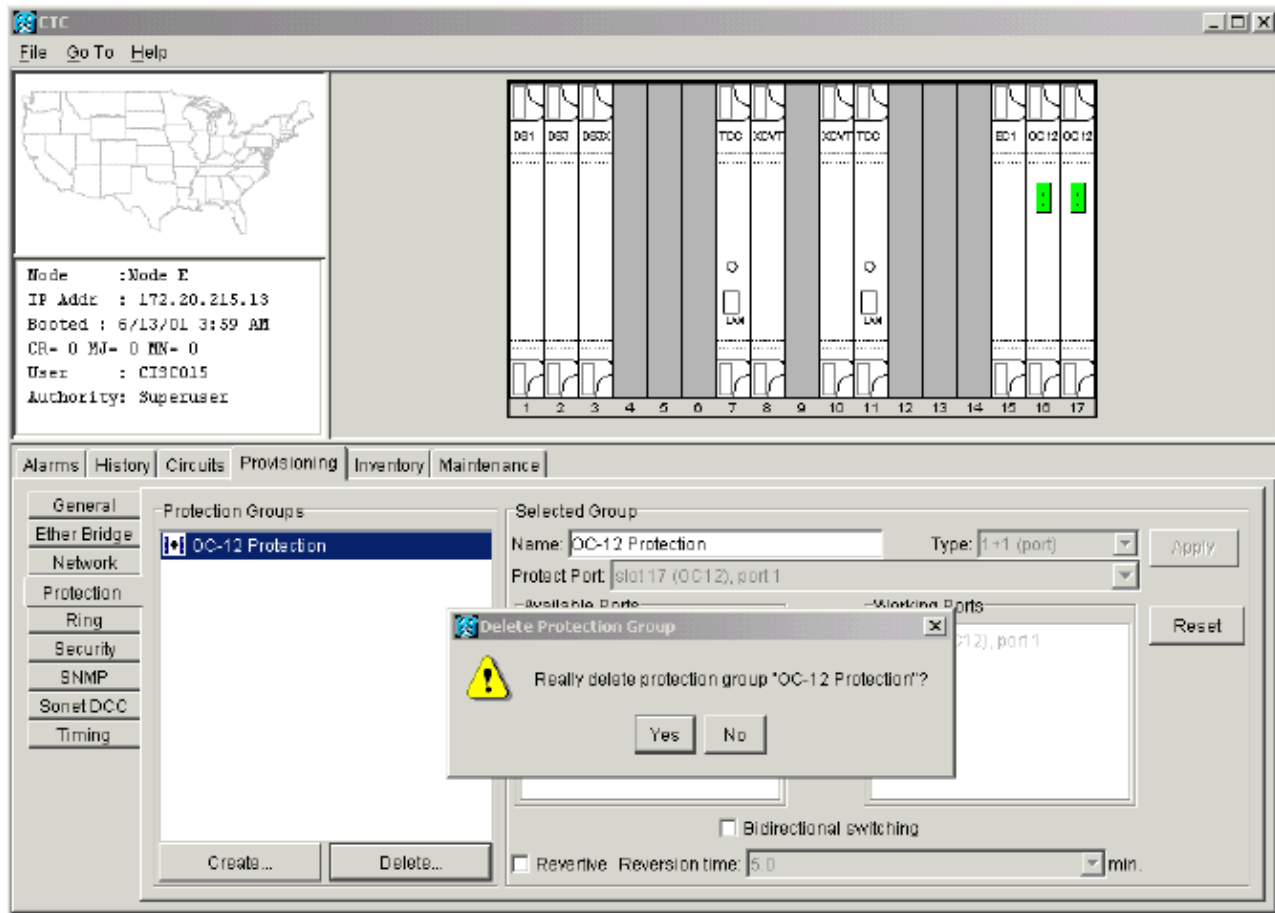


Remove the Protection Path at Node E

Complete these steps:

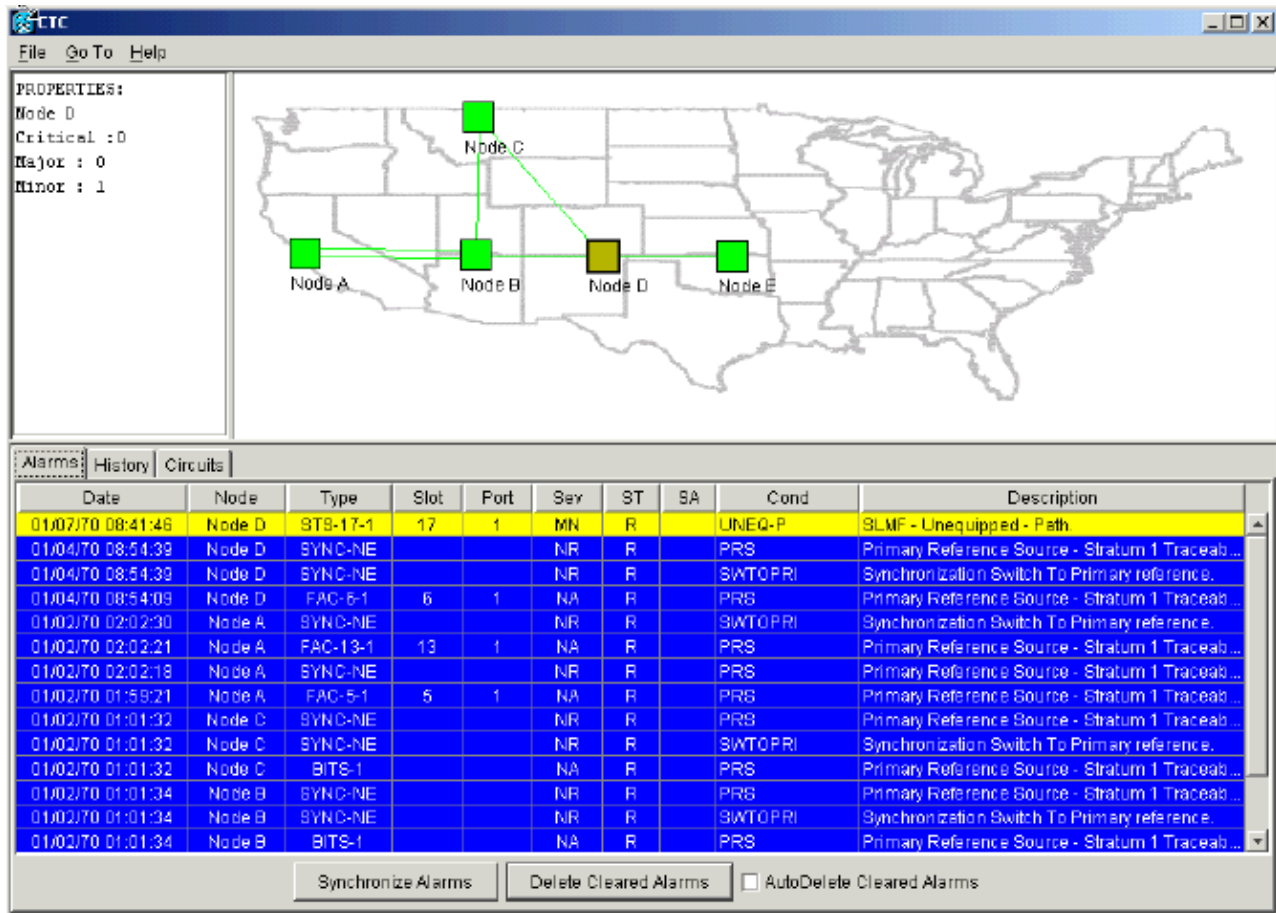
1. Select **Provisioning > Protection**.
2. Select the OC-12 protection group.
3. Click **Delete**.
4. Click **Yes** when you are prompted to confirm the deletion:

Figure 10 Delete the Protection Group at Node E



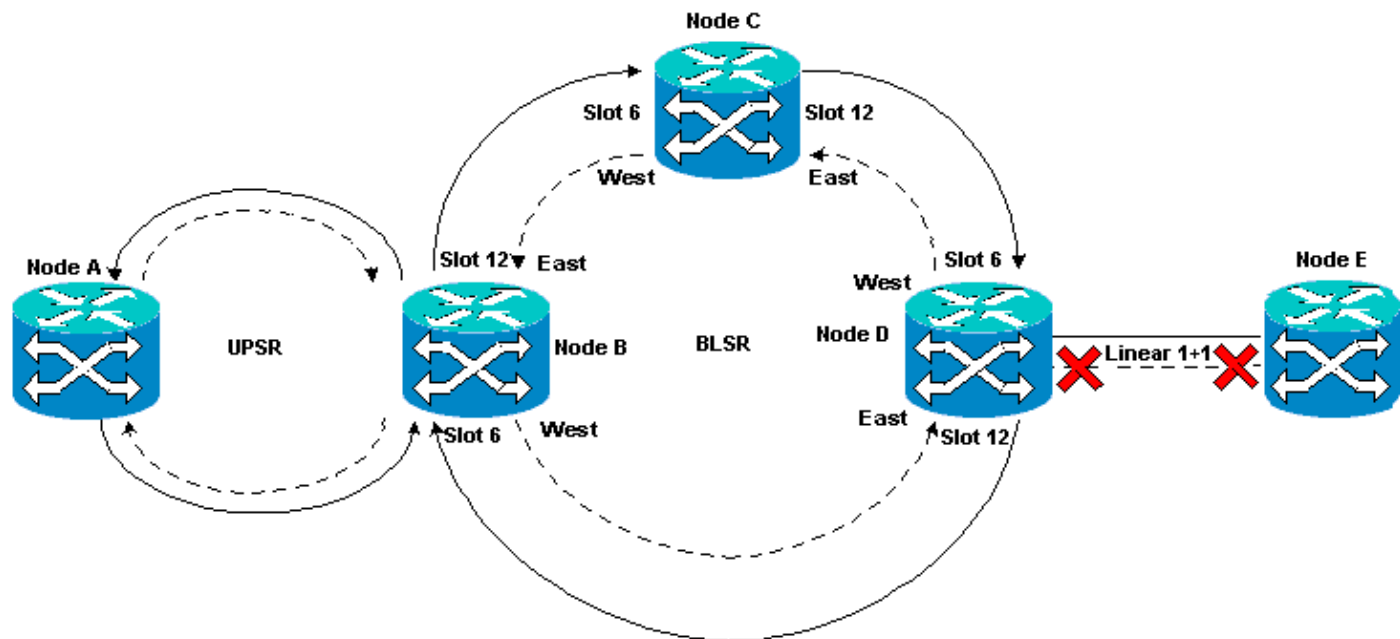
When you remove the protection path, Node E sends a Signal Label Mismatch Failure (SLMF) unequipped path alarm. Node D reports the SLMF alarm on the active alarms screen:

Figure 11 The SLMF Alarm



Note: The linear 1+1 protection is not removed until you remove the protection at both nodes E and D of the linear 1+1 span. If you created a circuit from Node A to Node D, it still remains fully protected:

Figure 12 The Protection Path is Removed at Nodes D and E

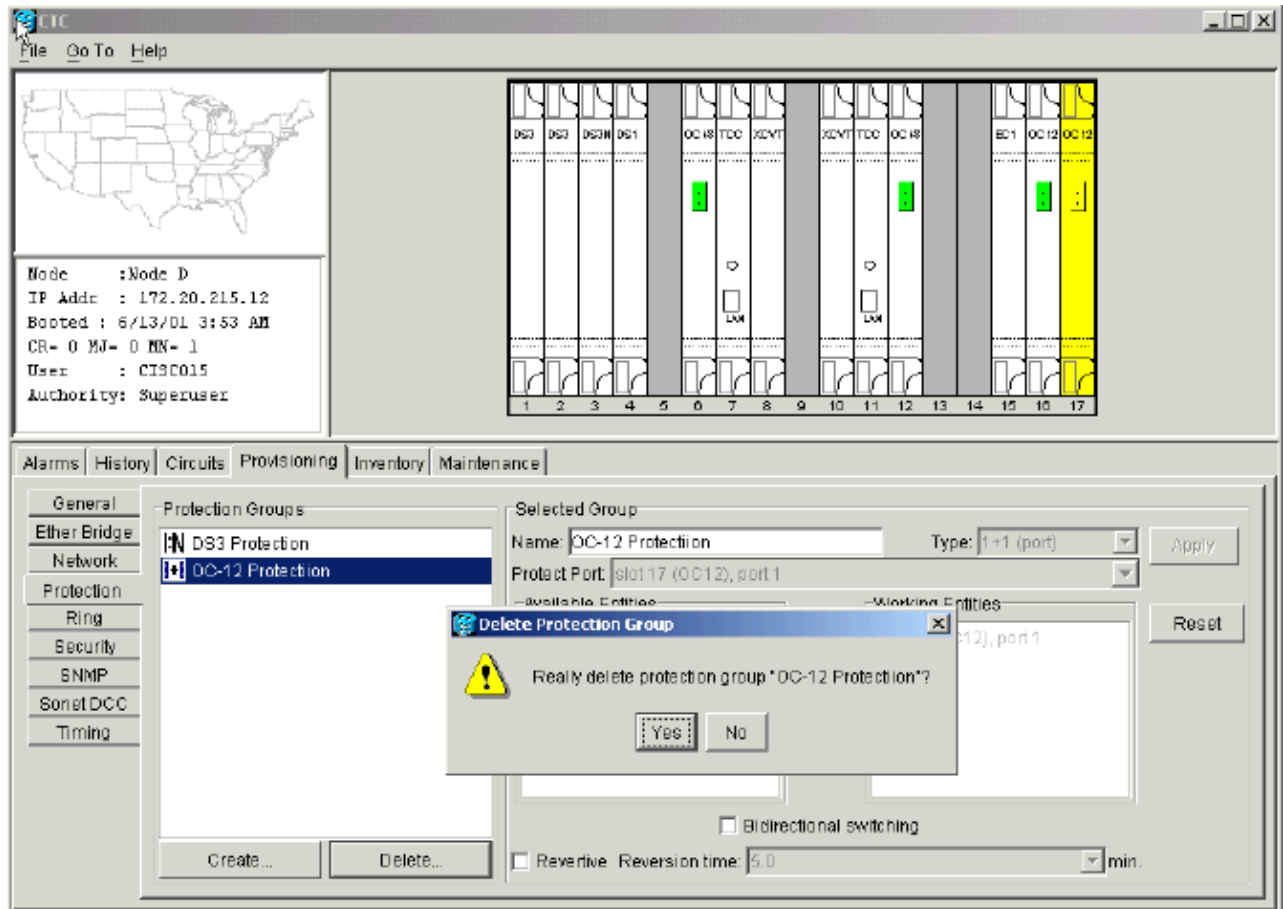


Remove the Protection Group at Node D

Complete these steps:

Repeat steps 1 through 4 of the Remove the Protection Path at Node E procedure to remove the protection group at Node D:

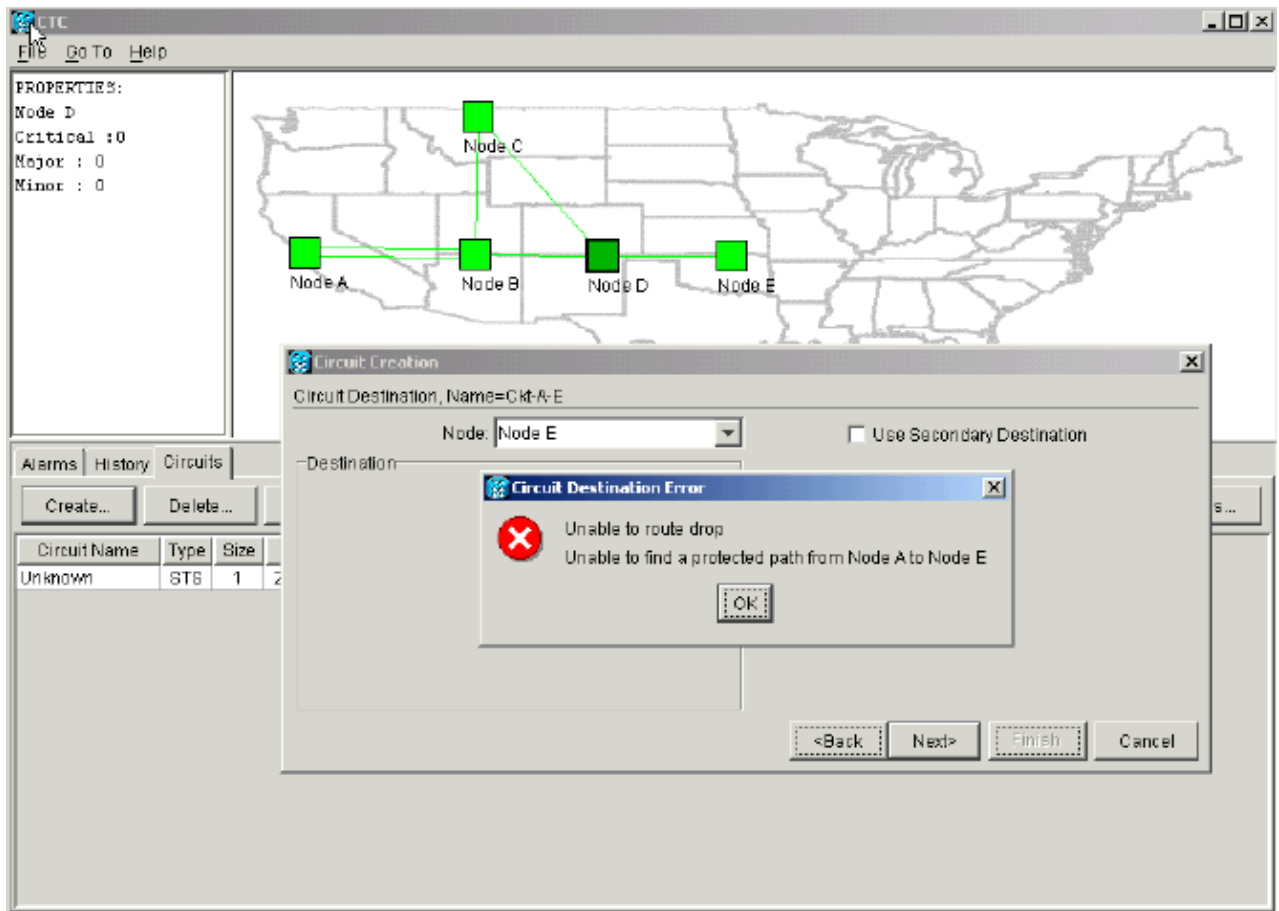
Figure 13 Delete the Protection Group at Node D



Circuit Creation Failure Due to Lack of Path Protection

Repeat the steps illustrated in the Configure an Automatically Provisioned Fully Protected Circuit section to create the circuit from Node A to Node E. The circuit creation fails because the 15454 is no longer able to create a fully protected path on the network span from Node D to Node E:

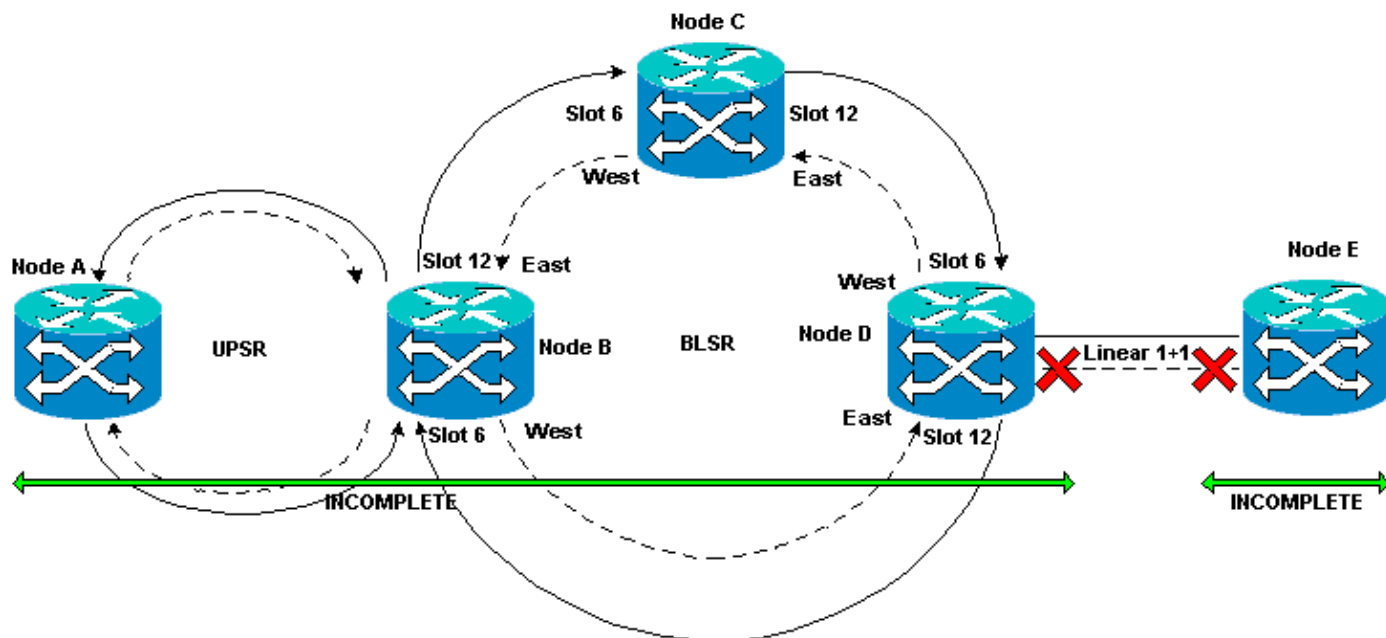
Figure 14 Circuit Creation Fails



INCOMPLETE Circuits Due to a Fiber Break

If a configured circuit loses its end to end connectivity, it goes into an INCOMPLETE state:

Figure 15 Circuit Goes into an INCOMPLETE State



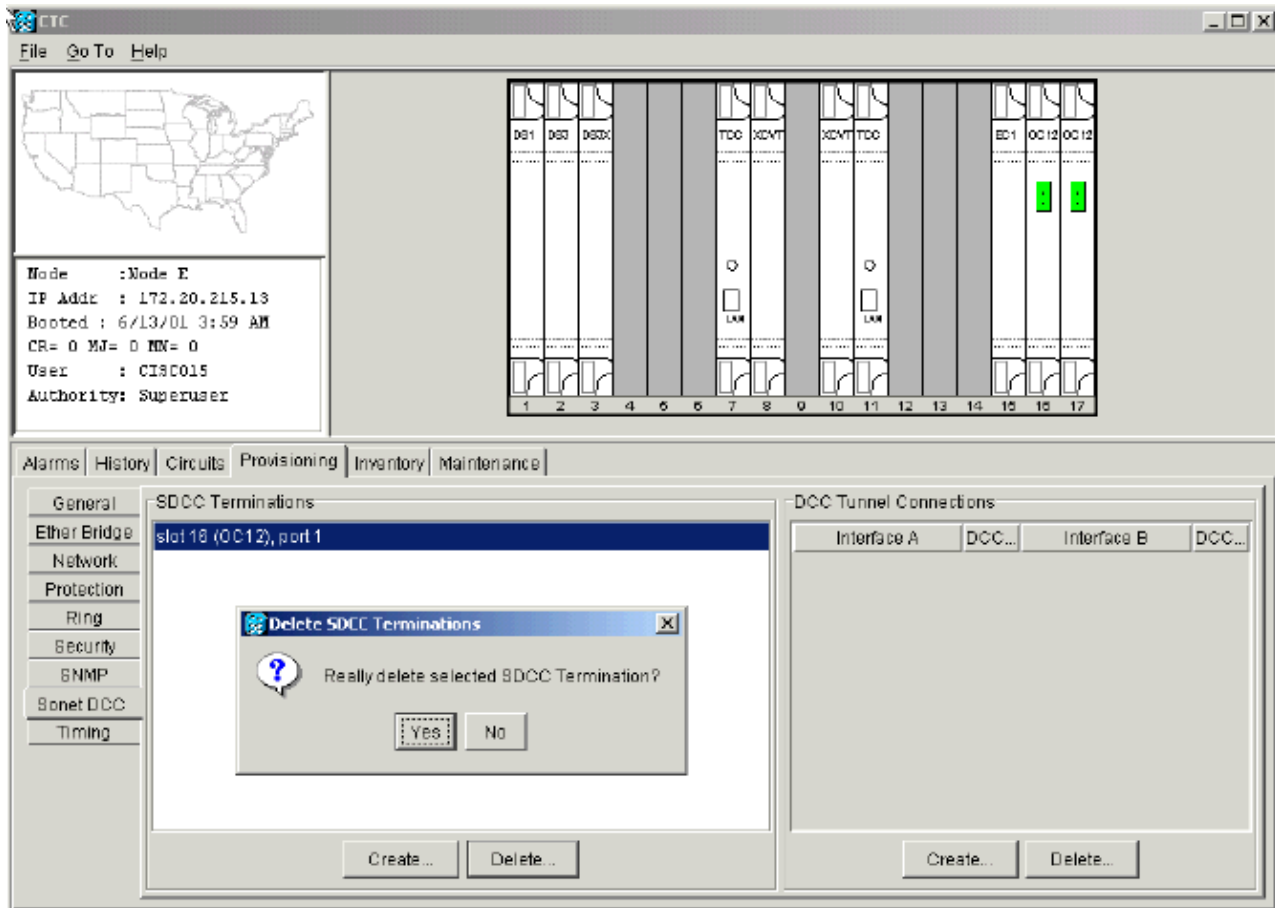
Simulate an INCOMPLETE Circuit

Complete these steps:

1. Select **Provisioning > Sonet DCC**.
2. Select the required SDCC termination, and click **Delete**.

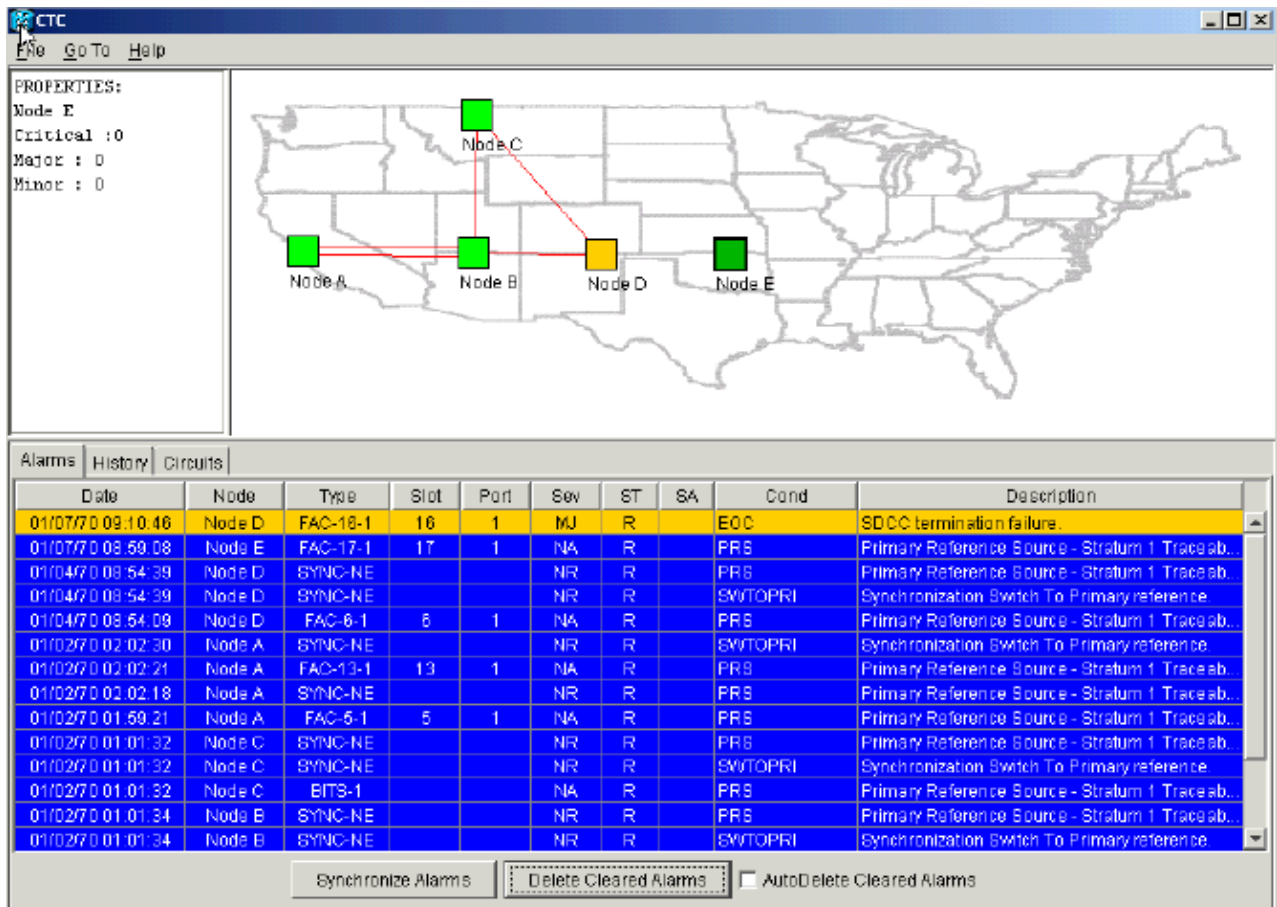
Remove the Synchronous Optical Network (SONET) Data Communications Channel (SDCC) terminations at Nodes D and E in order to simulate a fiber break:

Figure 16 Remove the SDCC Termination



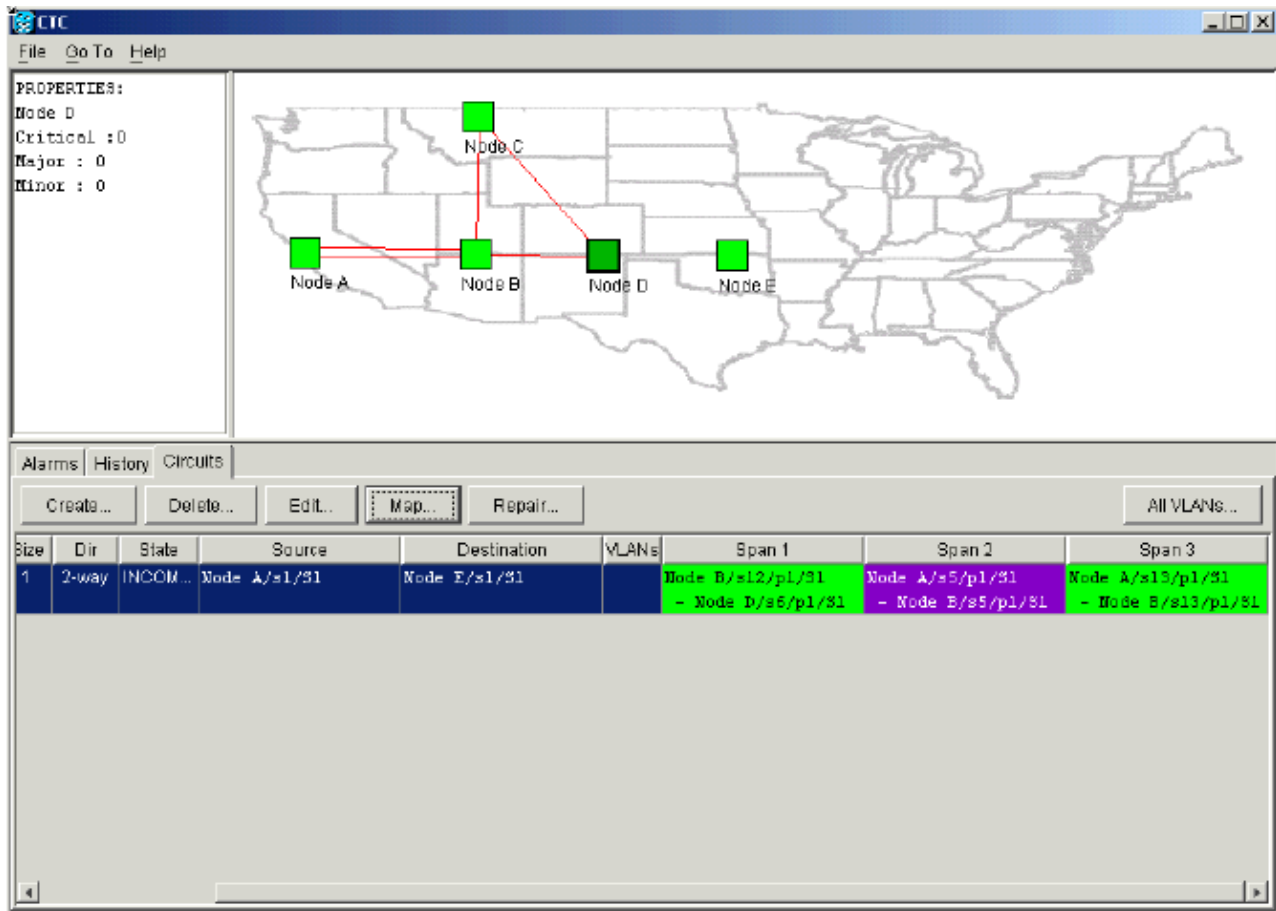
When you remove the SDCC termination at Node E, an SDCC termination failure is generated. Node D receives and sends the SDCC termination failure to the active alarms screen. From the network level view, the green line that links Node D to Node E disappears:

Figure 17 The SDCC Termination Failure



The circuit you created from Node A to Node E loses its end-to-end connectivity and goes into an INCOMPLETE state. From the right side of the circuit display, the span from Node D to Node E is now absent:

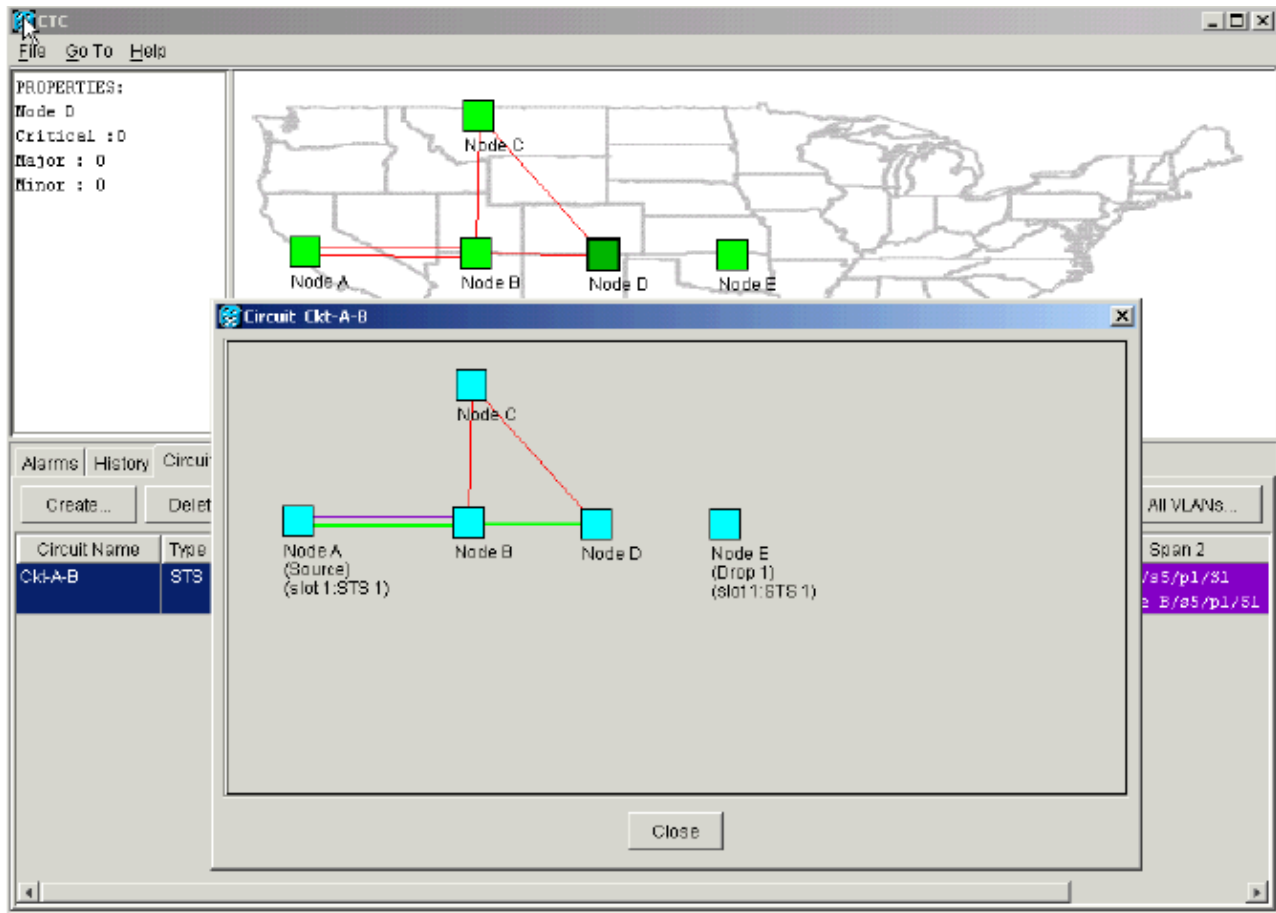
Figure 18 Circuit is in INCOMPLETE State



3. Select **Circuit > Maps** from the network level view.

The network topology displays the automatically provisioned circuits path that is taken. However, now the span from Node D to Node E is absent, and the circuit terminates at Node D:

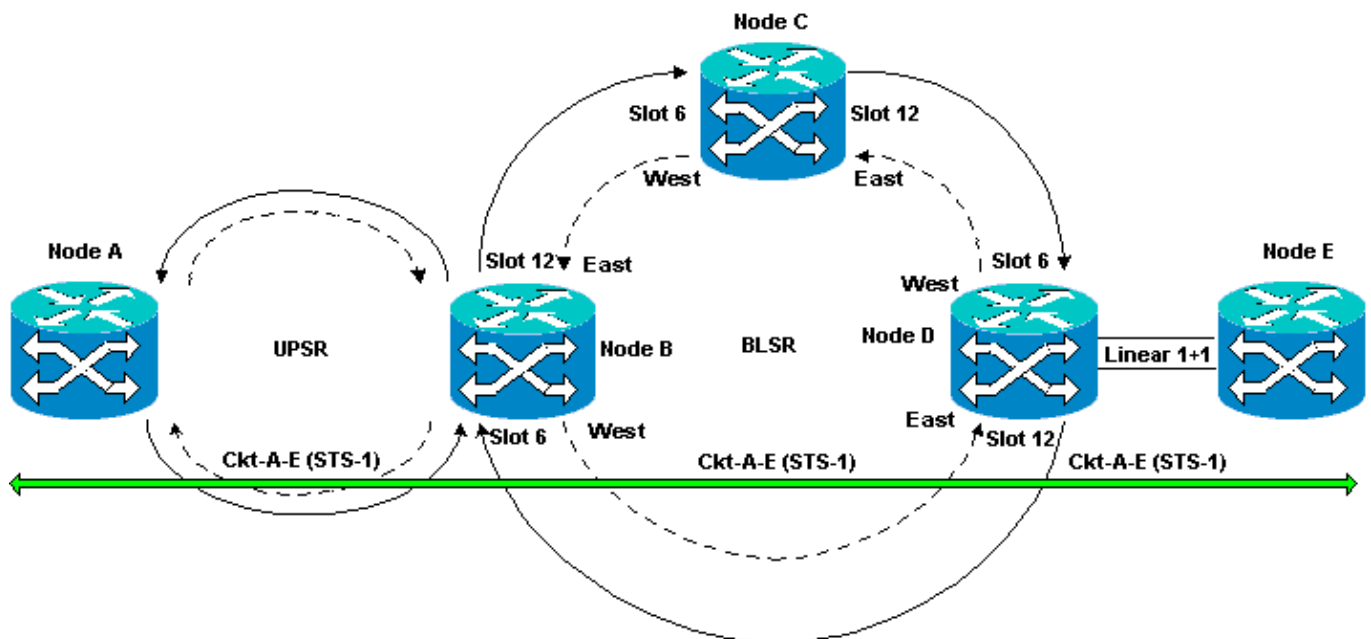
Figure 19 Circuit Terminates at Node D



Revert Circuits to ACTIVE State

When CTC connectivity is restored to both end points of the circuit, the circuit reverts to ACTIVE state.

Figure 20 Circuits Revert to ACTIVE State

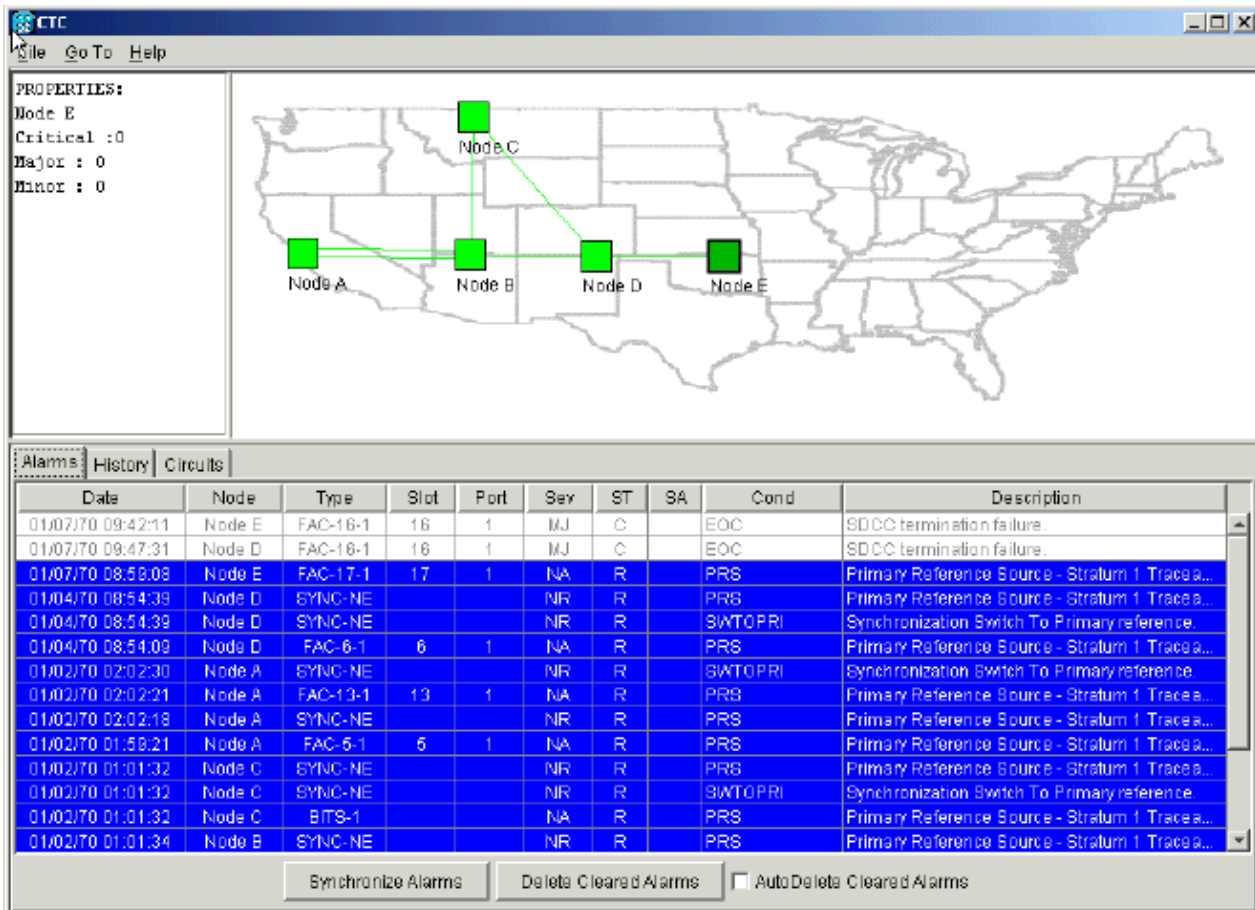


Complete these steps:

1. Configure the SDCC terminations again on Node D and E.

The green line between Node D and Node E now reappears. Also, the SDCC termination failure alarms white out:

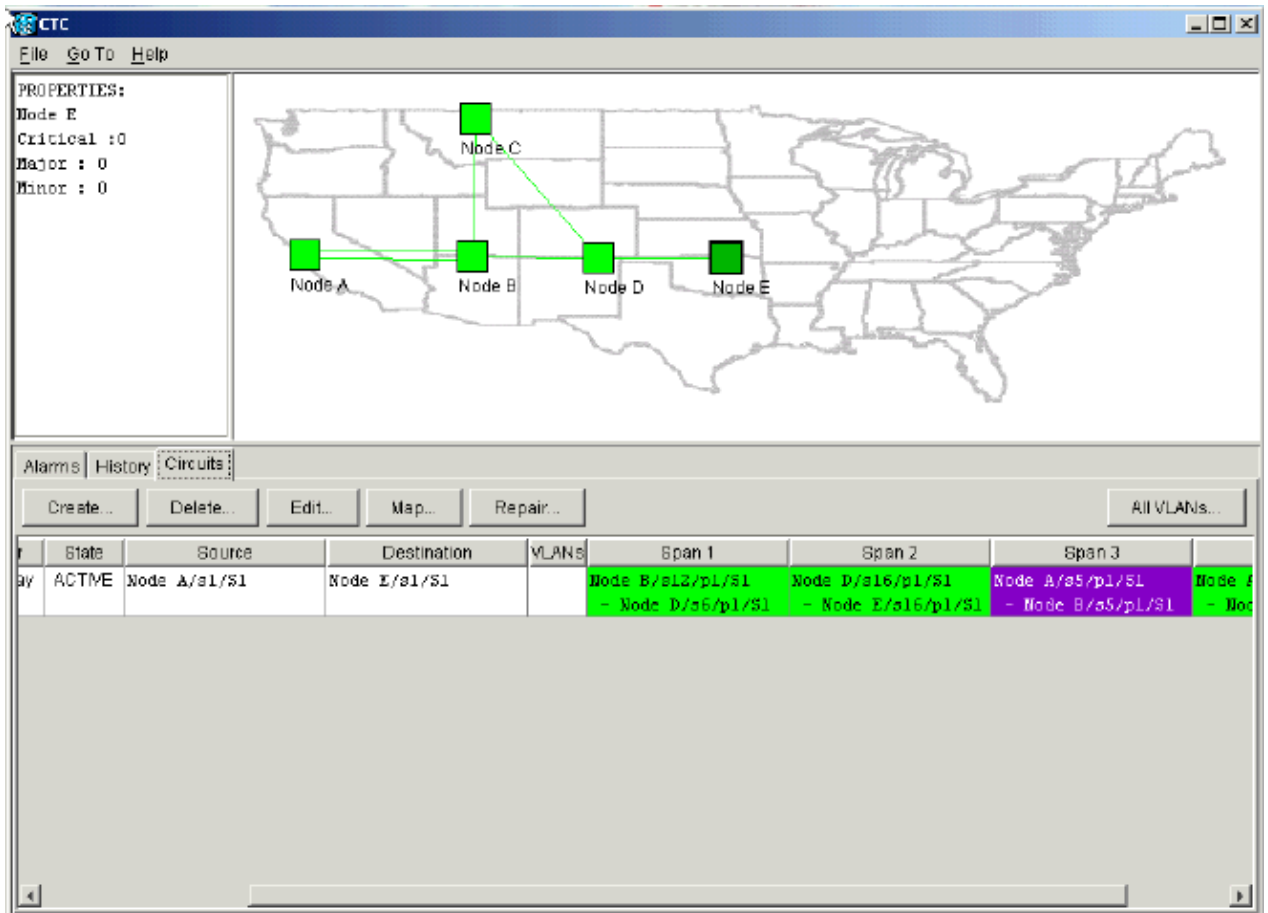
Figure 21 SDCC Termination Failure Alarms White Out



2. Click the **Circuits** tab.

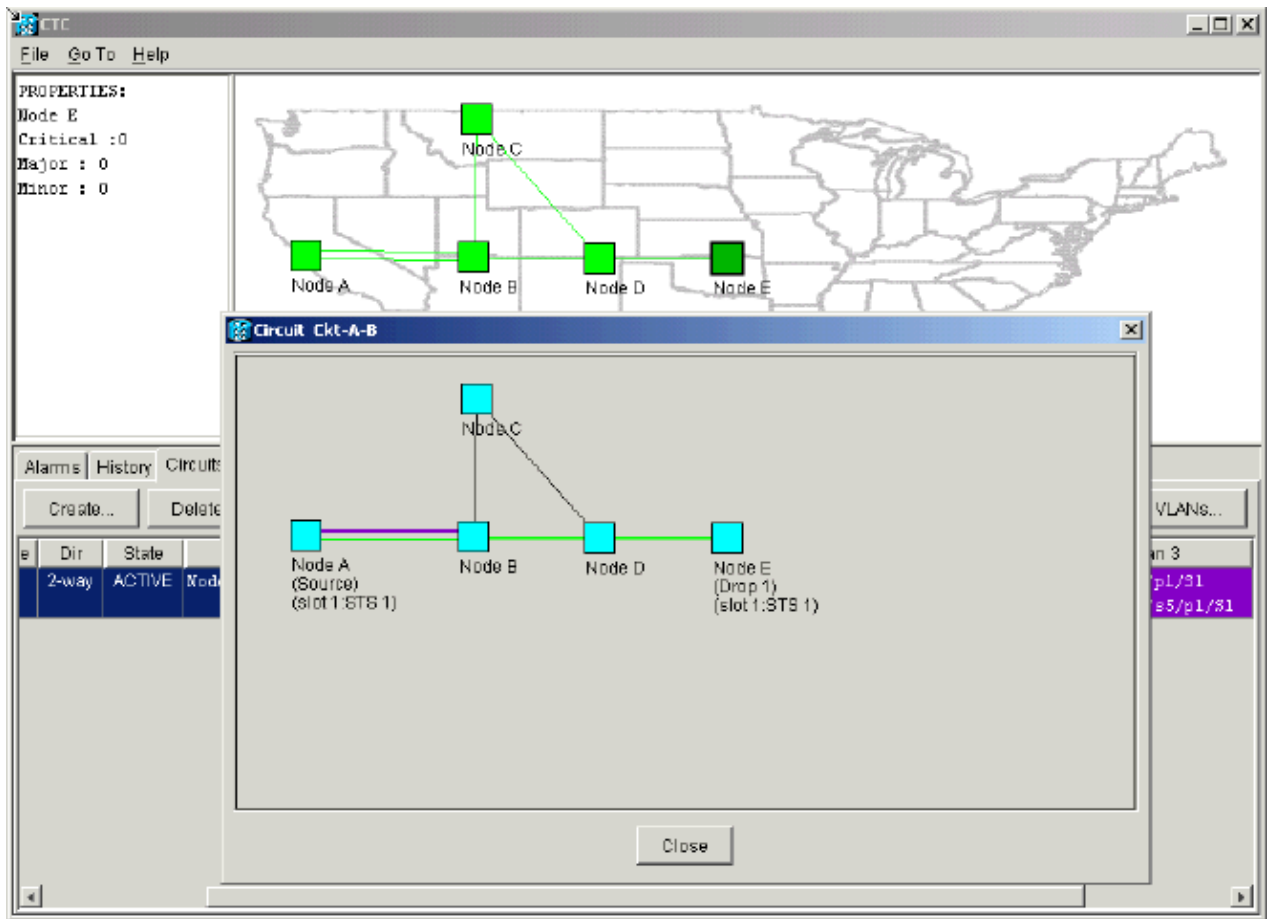
Figure 22 indicates that the circuit from Node A to Node E regains the information on the right side about the span from Node D to Node E. Also, as the end-to-end connectivity is restored, the circuit returns to an ACTIVE state:

Figure 22 End-to-end Connectivity is Restored, and the Circuit Returns to an ACTIVE State



3. Select the circuit, and click **Map**. The path the circuit takes through the network topology is displayed:

Figure 23 Circuit Path Through the Network Topology



You can confirm that the same behavior occurs on the other side of the fiber break. If you had closed and then reopened the CTC session on Node E, initially CTC knows about this session, and the incomplete circuit that terminated on it:

Figure 24 Same Behavior on the Other Side of the Fiber Break

Figure 25 shows the CIC software interface. At the top, there is a menu bar with 'File', 'Go To', and 'Help'. Below the menu bar is a 'PROPERTIES:' section on the left and a map of the United States on the right. A green square on the map is labeled 'Node E'. Below the map is a tabbed interface with 'Alarms', 'History', and 'Circuits' tabs. The 'Alarms' tab is active, displaying a table with the following data:

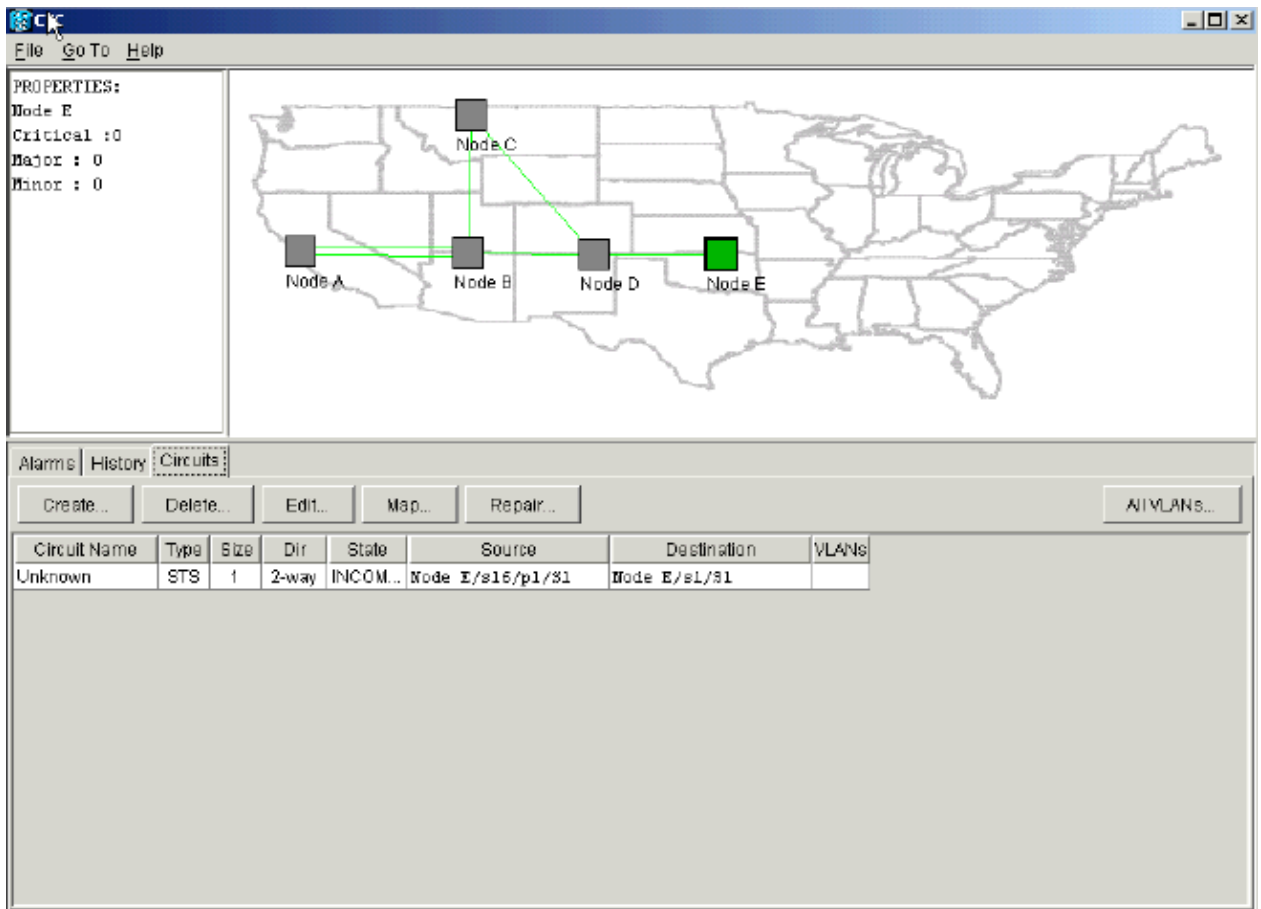
Date	Node	Type	Slot	Port	Sev	ST	SA	Cond	Description
01/07/70 08:59:08	Node E	FAC-17-1	17	1	NA	R		PRS	Primary Reference Source - Stratum 1 Traceab...
01/04/70 09:13:57	Node E	SYNC-NE			NR	R		SWTOPRI	Synchronization Switch To Primary reference...
01/04/70 09:13:28	Node E	FAC-16-1	16	1	NA	R		PRS	Primary Reference Source - Stratum 1 Traceab...

At the bottom of the interface, there are three buttons: 'Synchronize Alarms', 'Delete Cleared Alarms', and a checkbox labeled 'AutoDelete Cleared Alarms'.

4. Configure SDCC terminations on Node E. Node E starts to learn about the other nodes in the network.

Note: At this stage, the circuit is still in INCOMPLETE state:

Figure 25 Configure SDCC Terminations on Node E



As the nodes continue to initialize, Node E starts to learn about the destinations for the incomplete circuit:

Figure 26 Node E Learns About the Destinations for the Incomplete Circuit

CTC

File Go To Help

PROPERTIES:
Node E
Critical : 0
Major : 0
Minor : 0

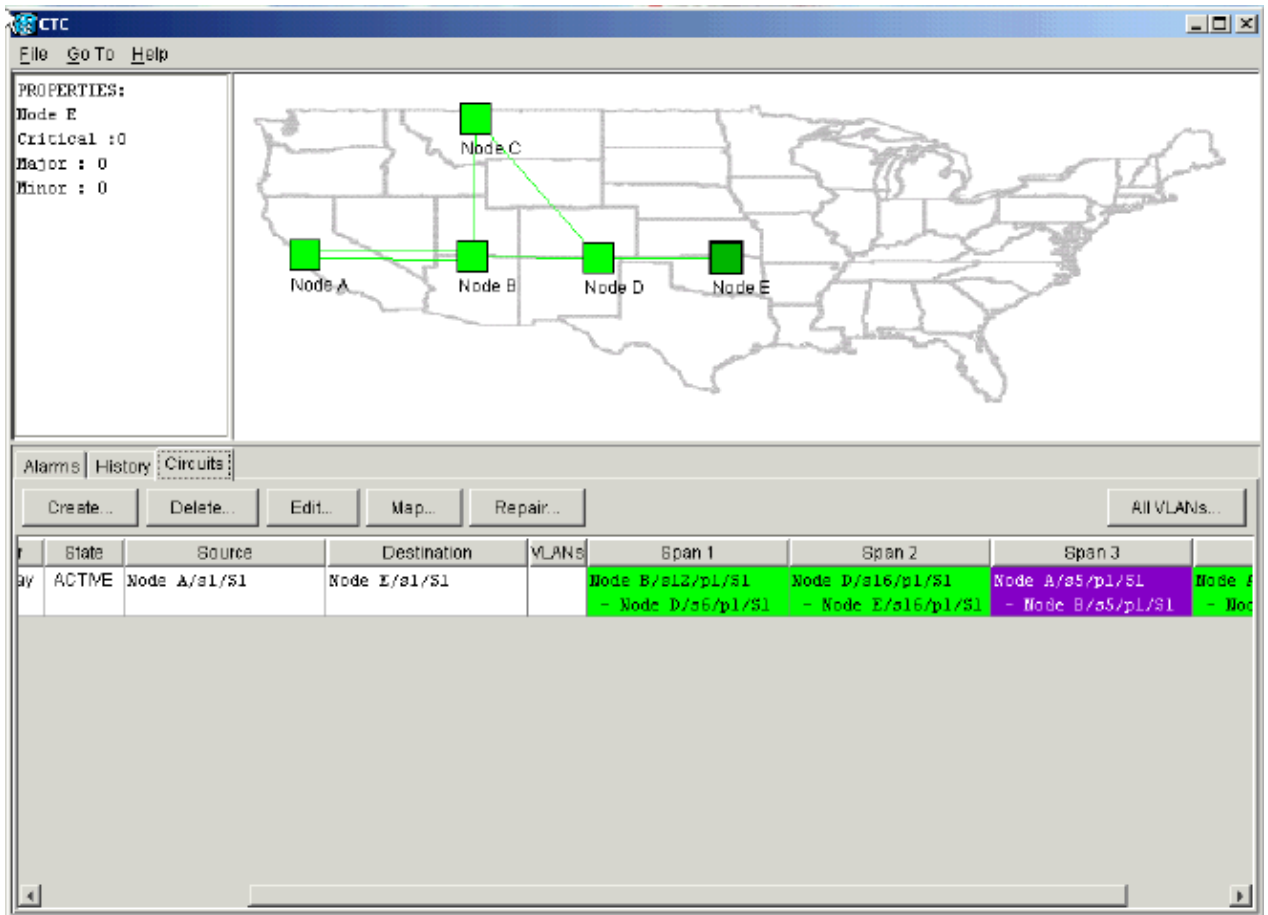
Alarms History **Circuits**

Create... Delete... Edit... Map... Repair... All VLANs...

Circuit Name	Type	Size	Dir	State	Source	Destination	VLANs
Unknown	STS	1	2-way	INCOM...	Node E/s16/p1/S1	Node E/s1/S1 Node B/s13/p1/S1 Node B/s5/p1/S1 Node B/s12/p1/S1	

Next, the CTC application learns about all the nodes in the network and the path to the end points of the circuit. The circuit then reverts to an ACTIVE state:

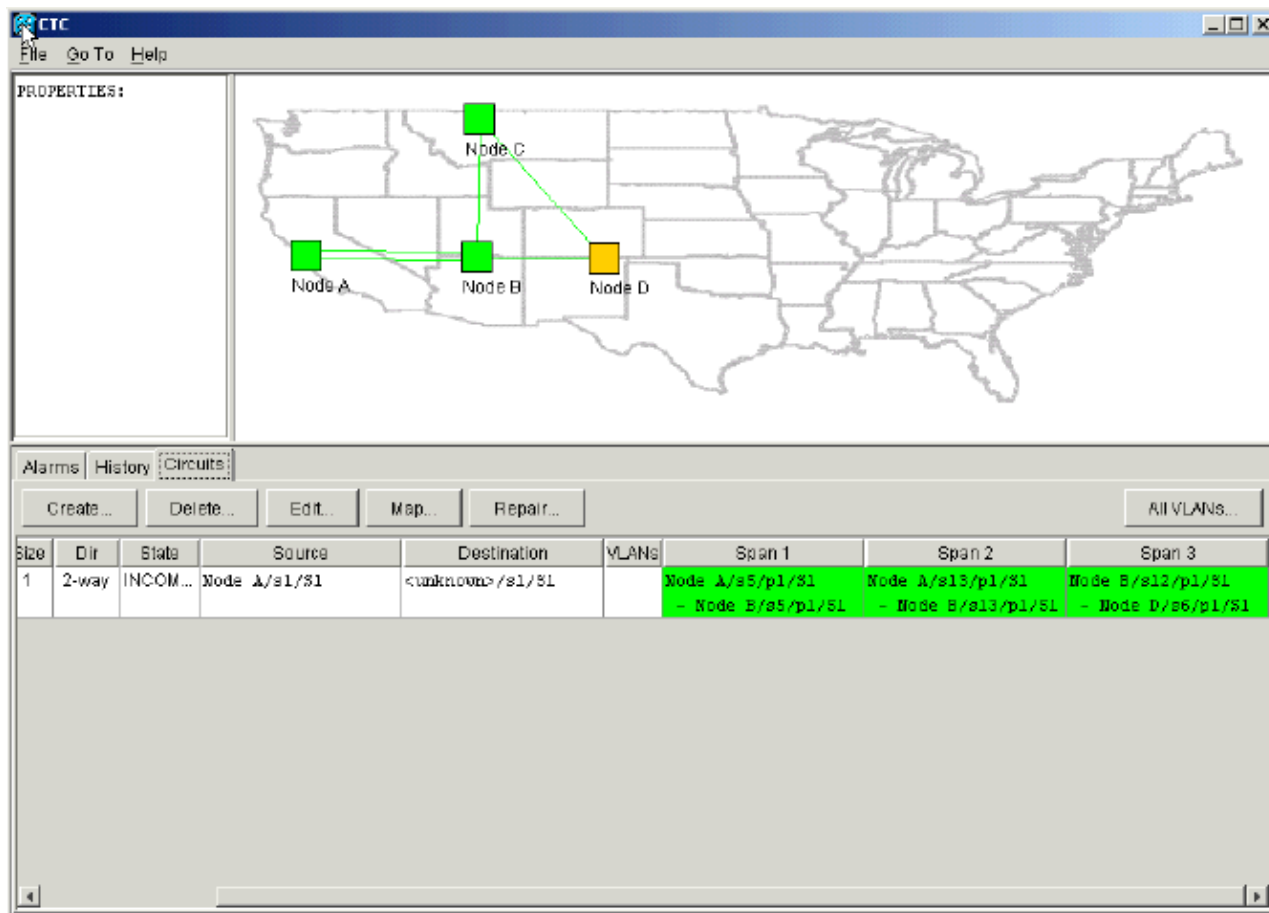
Figure 27 Circuit Reverts to the ACTIVE State



Delete Circuits to Strand Bandwidth

If the CTC session closes while the connection to Node E is down, CTC can only learn about the four nodes on its part of the network segment after a reconnection. CTC cannot learn about Node E until a valid connection is established with Node E. Here is the network topology that the CTC learns and builds:

Figure 28 Network Topology that the CTC Builds



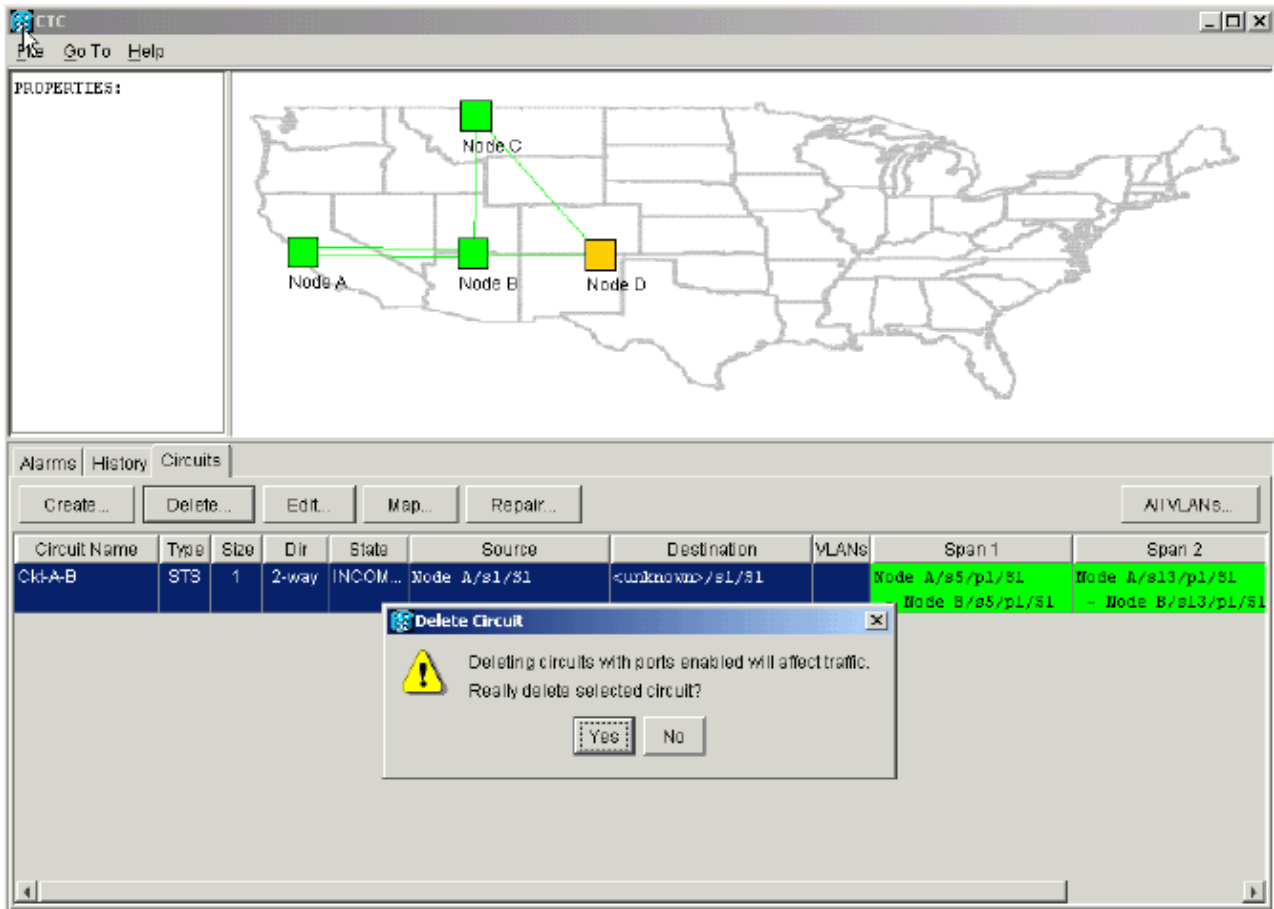
Delete a Circuit

Complete these steps:

1. In the **Circuits** tab, select the required circuit.
2. Click **Delete**.

The circuit is in the INCOMPLETE state. The CTC is not able to make the circuit active because there is no information about the end point of the circuit on Node E. When you try to delete the circuit, a warning message is displayed to indicate that if the circuit is active, traffic can be lost:

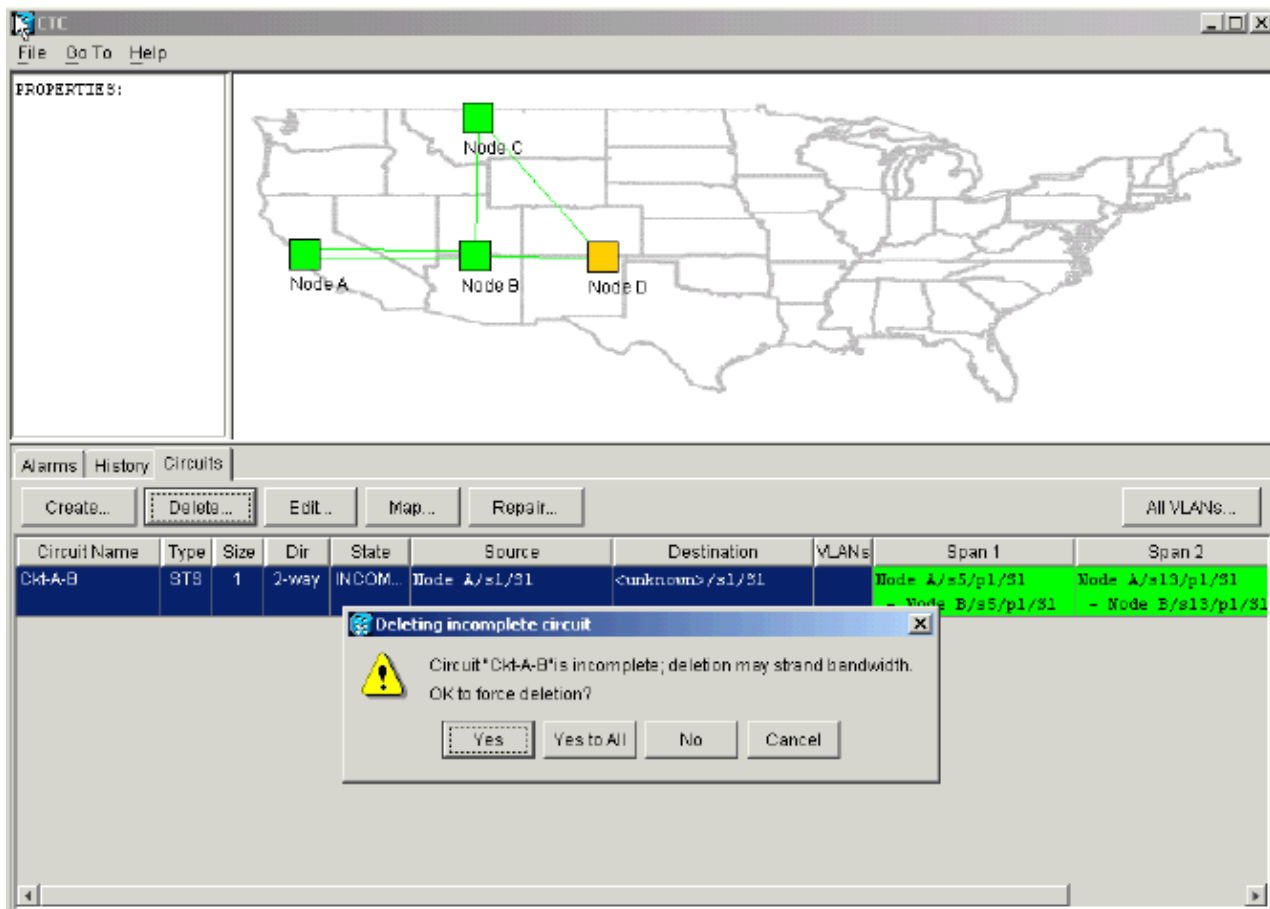
Figure 29 Warning Message When You Try to Delete a Circuit



3. Click **Yes** to confirm the deletion.

A second warning message is displayed to indicate that the deletion can strand the bandwidth:

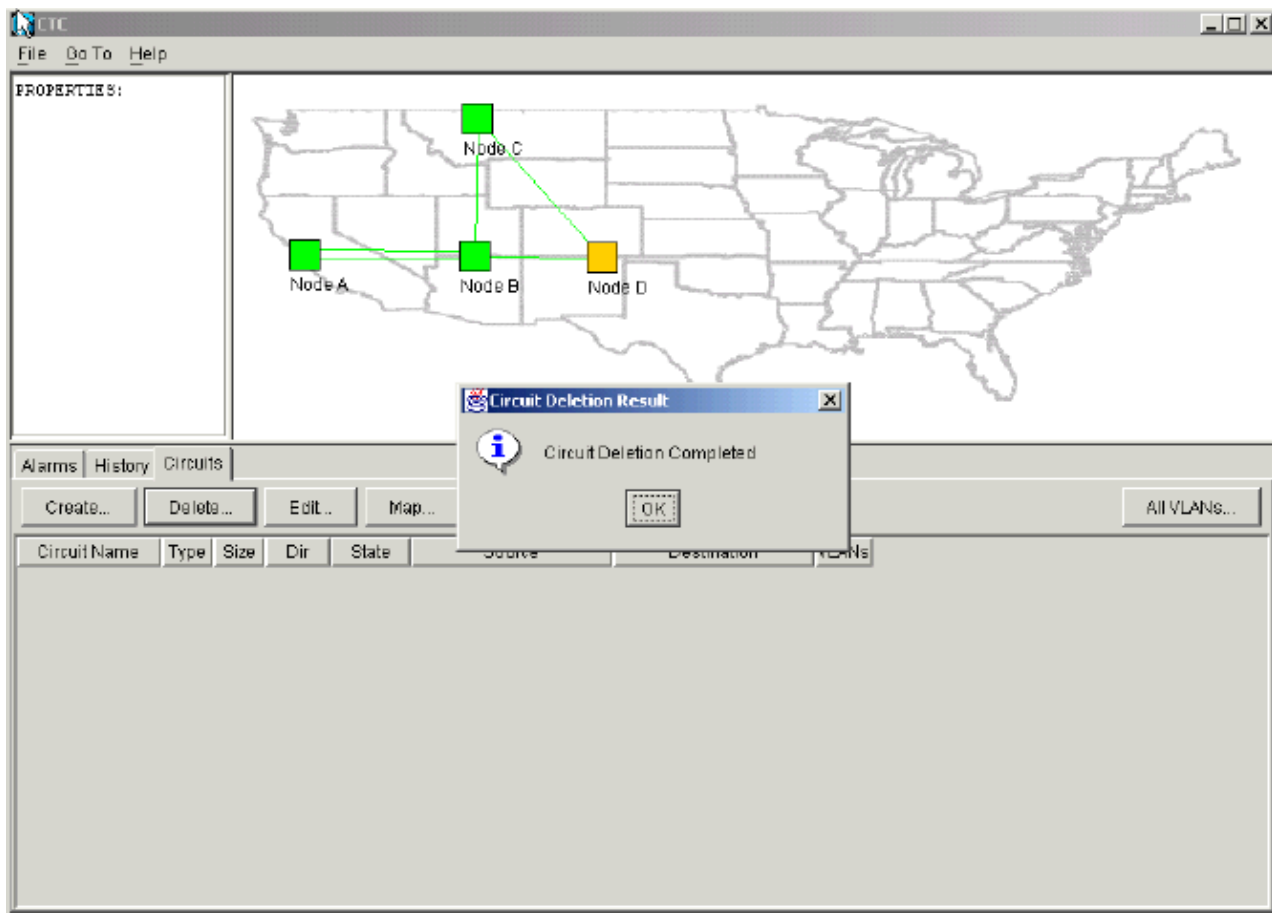
Figure 30 Second Warning Message



4. Click **Yes** again.

The circuit is deleted.

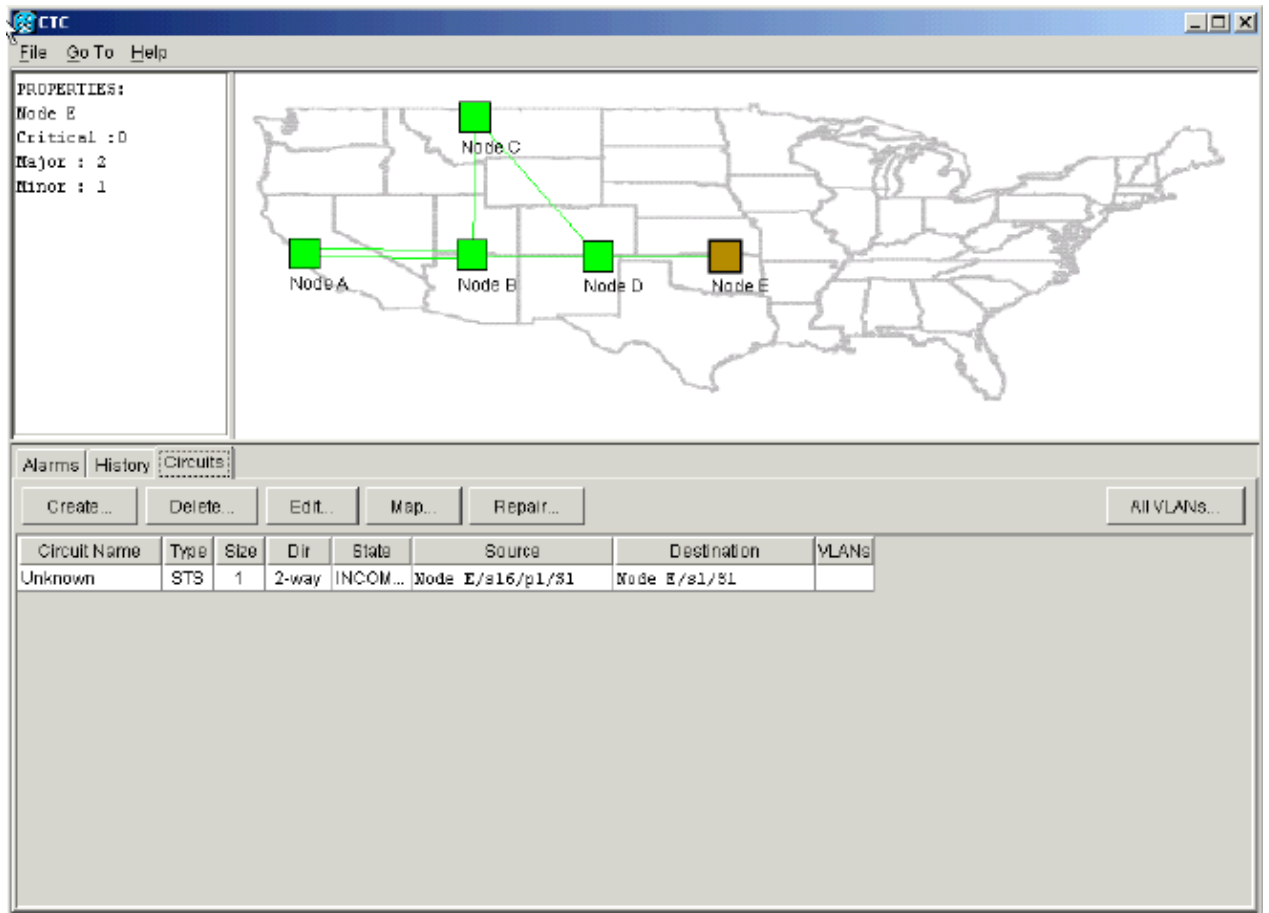
Figure 31 Confirmation of Circuit Deletion



However, Node E does not know that the circuit on the other part of the network segment is deleted. If you start a CTC session to Node E, and configure the SDCC terminations again, the CTC application is able to explore outwards from Node E and discover the network setup.

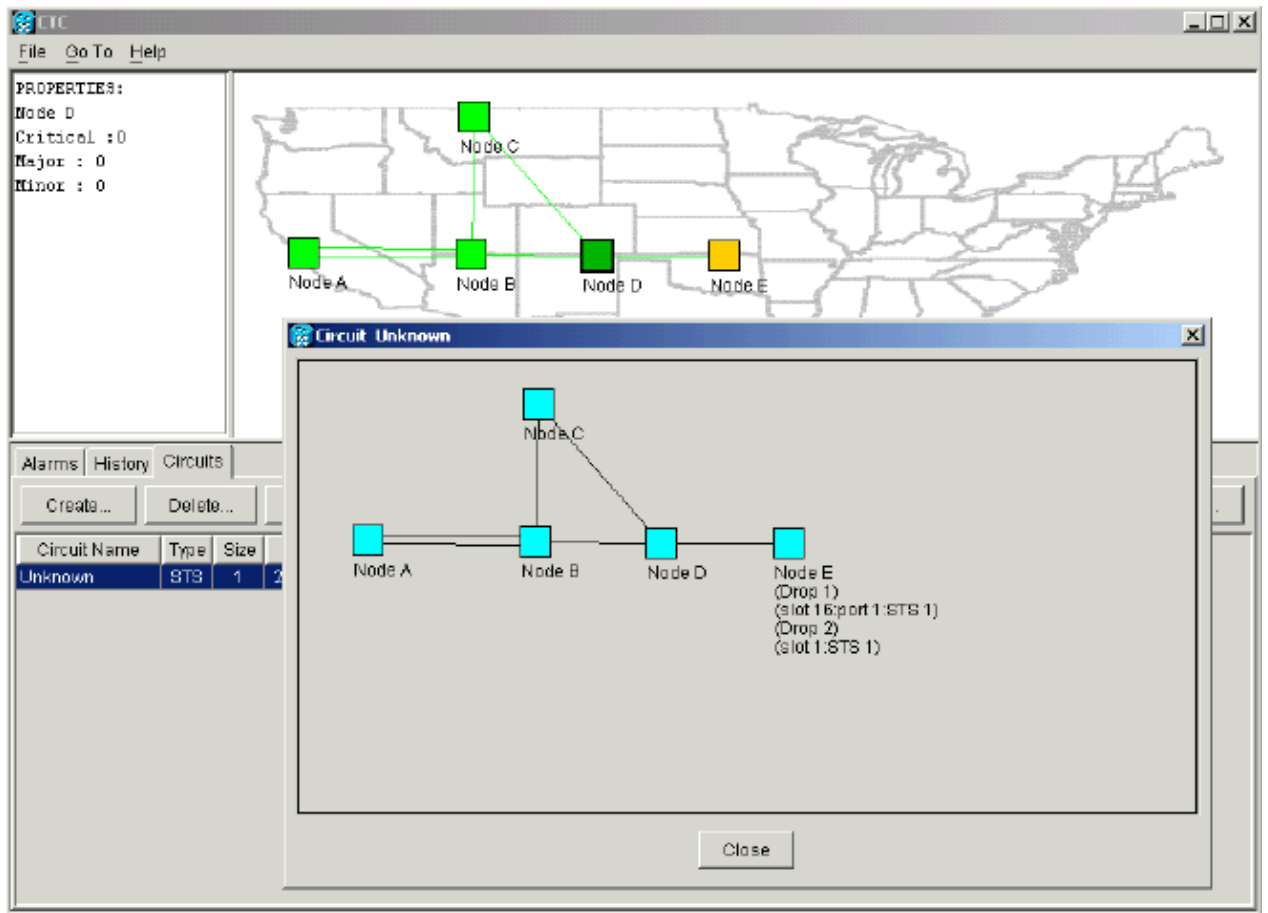
Node E was not in the CTC applications view of the network topology when you deleted the circuit. Therefore, Node E is unable to restore and activate the partially deleted circuit. The circuit remains in the INCOMPLETE state on Node E:

Figure 32 Circuit Remains in the INCOMPLETE State on Node E



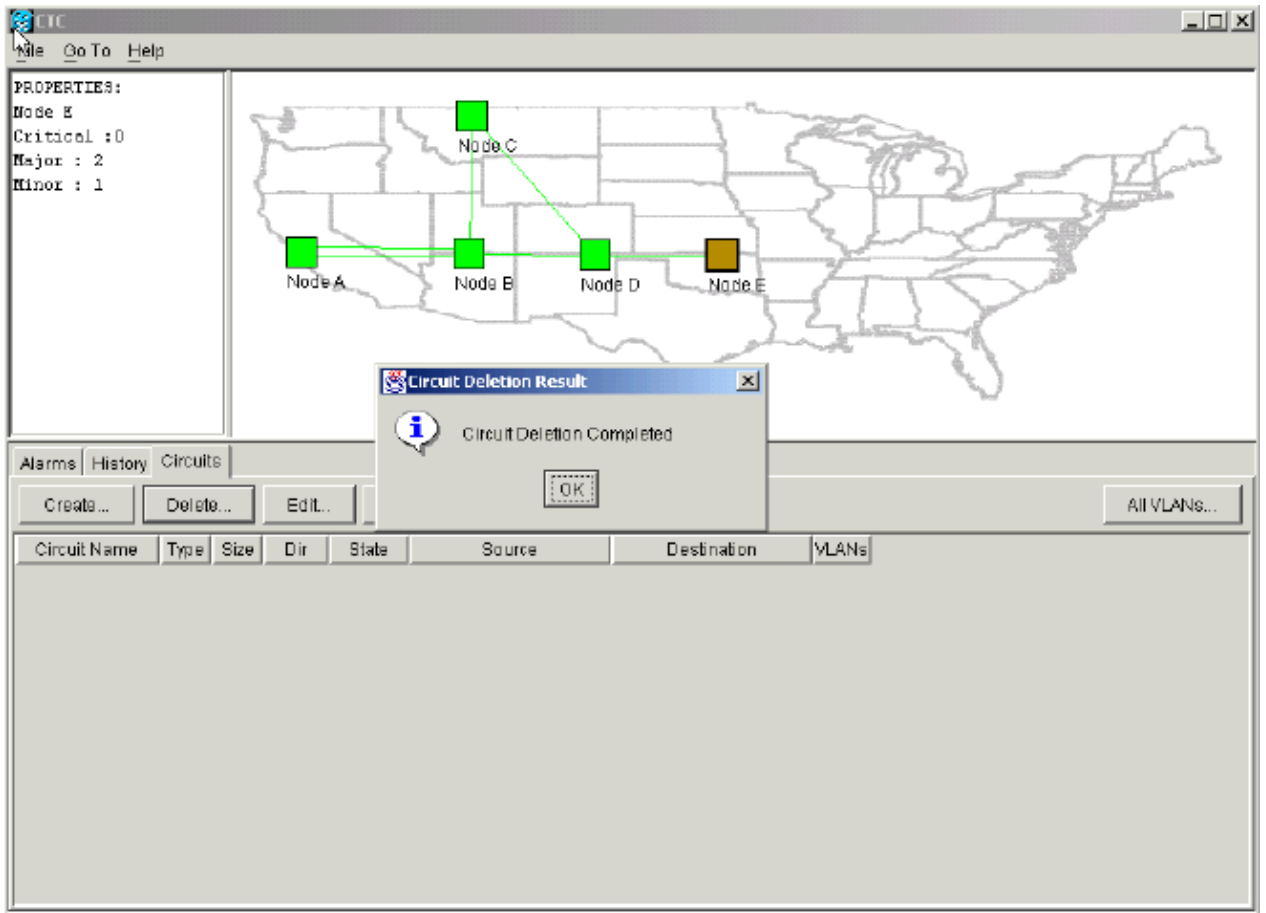
The circuit is now damaged. In order to verify this, you must look at the map view of the circuit.
5. Click **Map**.

Figure 33 Map View of the Damaged Circuit



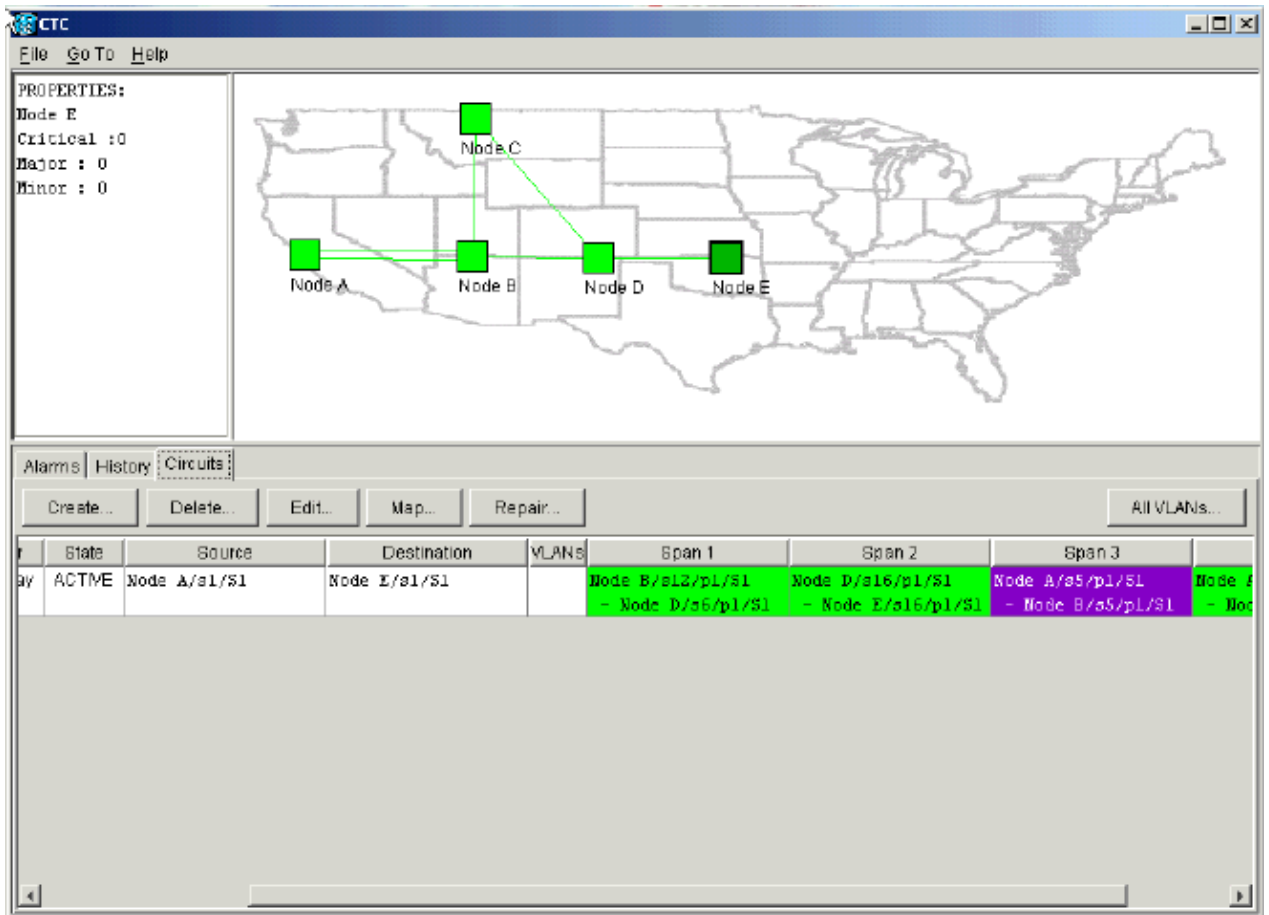
- The best practice that Cisco recommends is to delete the damaged circuit, and create the circuit again.
6. Ignore the two warning messages that indicate a loss of live traffic and that bandwidth can be stranded. Click **OK** on the deletion completion prompt.

Figure 34 Deletion Confirmation Prompt



7. Configure the circuit afresh. See the Configure an Automatically Provisioned Fully Protected Circuit section for step-by-step instructions.

Figure 35 Configure the Circuit Again



Related Information

- [Create Circuits and VT Tunnels](#)
- [Circuits and Tunnels](#)
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