



Card Protection

This chapter explains the Cisco ONS 15454 card protection configurations. To provision card protection, refer to the *Cisco ONS 15454 Procedure Guide*.

Chapter topics include:

- [Electrical Card Protection, page 6-1](#)
- [Electrical Card Protection and the Backplane, page 6-4](#)
- [Optical Card Protection, page 6-5](#)
- [Unprotected Cards, page 6-5](#)

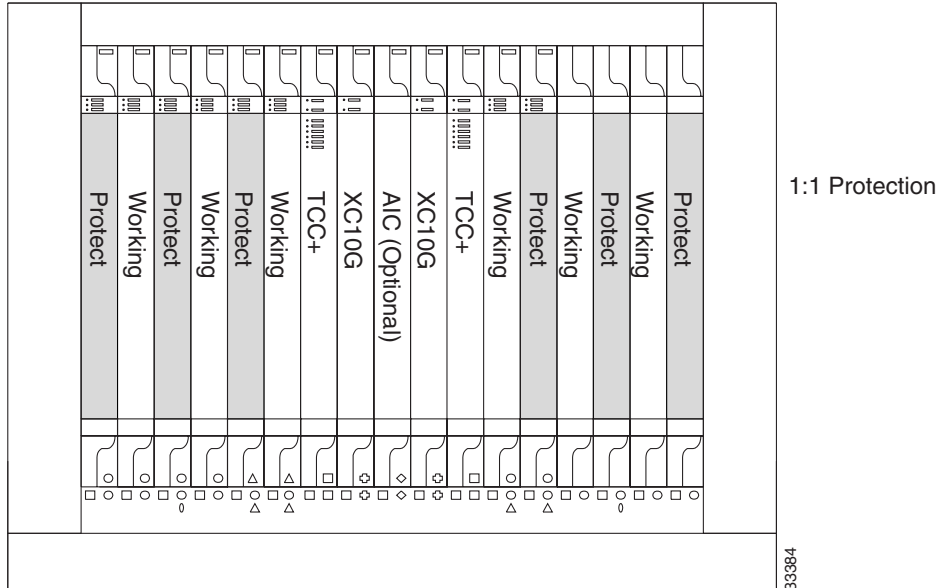
6.1 Electrical Card Protection

The ONS 15454 provides a variety of electrical card protection methods. This section describes the protection options. [Figure 6-1 on page 6-2](#) shows a 1:1 protection scheme and [Figure 6-2 on page 6-3](#) shows a 1:N protection scheme.

6.1.1 Protection, 1:1

In 1:1 protection, a working card is paired with a protect card of the same type. If the working card fails, the traffic from the working card switches to the protect card. You can provision 1:1 to be revertive or nonrevertive. If revertive, traffic automatically reverts to the working card after the failure on the working card is resolved. [Figure 6-1 on page 6-2](#) shows the ONS 15454 in a 1:1 protection configuration. Each working card in an even-numbered slot is paired with a protect card in an odd-numbered slot: Slot 1 is protecting Slot 2, Slot 3 is protecting Slot 4, Slot 5 is protecting Slot 6, Slot 17 is protecting Slot 16, Slot 15 is protecting Slot 14, and Slot 13 is protecting Slot 12. The following electrical cards use a 1:1 protection scheme: EC1-12, DS1-14, DS3-12, DS3-12E, and DSCXM-6.

Figure 6-1 ONS 15454 Cards in a 1:1 Protection Configuration

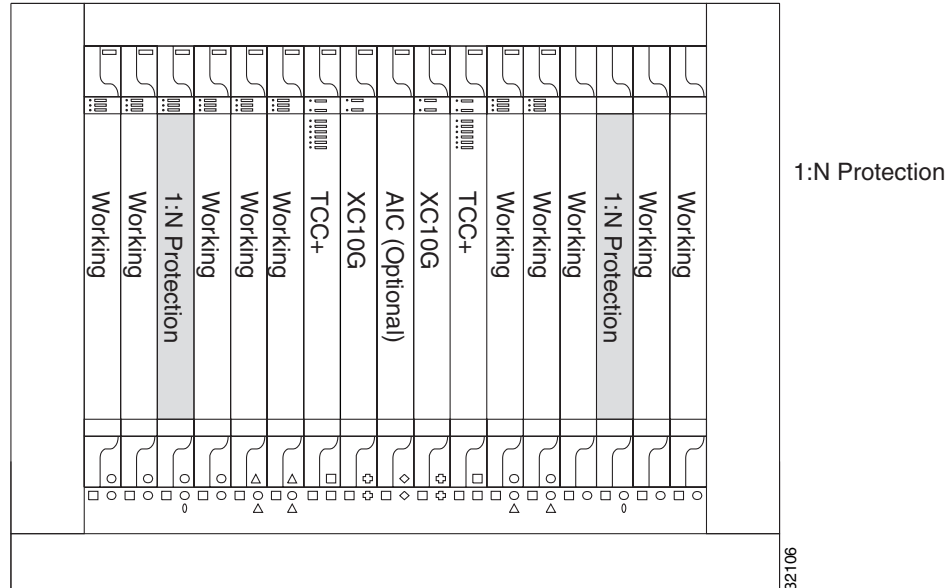


6.1.2 Protection, 1:N

1:N protection allows a single card to protect up to five working cards of the same DS-N level. A DS1N-14 card protects DS1-14 cards, a DS3N-12 card protects DS3-12 cards, and DS3N-12E cards protect DS3-12E cards. The standard DS1-14, DS3-12, and DS3-12E cards provide 1:1 protection only. Currently, 1:N protection operates only at the DS-1 and DS-3 levels. 1:N cards have added circuitry to act as the protection card in a 1:N protection group. Otherwise, the card is identical to the standard card and can serve as a normal working card.

The physical DS-1 or DS-3 interfaces on the ONS 15454 backplane use the working card until the working card fails. When the node detects this failure, the protection card takes over the physical DS-1 or DS-3 electrical interfaces through the relays and signal bridging on the backplane. [Figure 6-2 on page 6-3](#) shows the ONS 15454 in a 1:N protection configuration. Each side of the shelf assembly has only one card protecting all of the cards on that side.

Figure 6-2 ONS 15454 Cards in a 1:N Protection Configuration



6.1.2.1 Revertive Switching

1:N protection supports revertive switching. Revertive switching sends the electrical interfaces (traffic) back to the original working card after the card comes back online. Detecting an active working card triggers the reversion process. There is a variable time period for the lag between detection and reversion, called the revertive delay, which you can set using the ONS 15454 software, Cisco Transport Controller (CTC). To set the revertive delay, refer to the *Cisco ONS 15454 Procedure Guide*. All cards in a protection group share the same reversion settings. 1:N protection groups default to automatic reversion.

6.1.2.2 Protection Guidelines, 1:N

Several rules apply to 1:N protection groups in the ONS 15454:

- Working and protect card groups must reside in the same card bank (A or B)
- The 1:N protect card must reside in Slot 3 for side A and Slot 15 for side B
- Working cards may sit on either or both sides of the protect card

The ONS 15454 supports 1:N equipment protection for all add-drop multiplexer configurations (ring, linear, and terminal), as specified by Telcordia GR-253-CORE.

The ONS 15454 automatically detects and identifies a 1:N protection card when the card is installed in Slot 3 or Slot 15. However, the slot containing the 1:N card in a protection group must be manually provisioned as a protect slot because by default all cards are working cards.

For detailed procedures on setting up DS-1 and DS-3 protection groups, refer to the *Cisco ONS 15454 Procedure Guide*.

6.2 Electrical Card Protection and the Backplane

Protection schemes for electrical cards differ slightly depending on the Electrical Interface Assembly (EIA) type used on the ONS 15454 backplane. The difference is due to the varying connector size. For example, because BNC connectors are larger, fewer DS3-12 cards can be supported when using a BNC connector.



Note

For EIA installation, refer to the *Cisco ONS 15454 Procedure Guide*.



Caution

When a protection switch moves traffic from the DS3-12 working/active card to the DS3-12 protect/standby card, ports on the new active/standby card cannot be taken out of service as long as traffic is switched. Lost traffic can result when a port is taken out of service even if the DS3-12 standby card no longer carries traffic.

6.2.1 Standard BNC Protection

When you use BNC connectors, the ONS 15454 supports 1:1 protection or 1:N protection for a total of four working DS-3 electrical cards. If you are using EC-1 electrical cards with the BNC EIA, the ONS 15454 supports 1:1 protection and a total of four working cards. Slots 2, 4, 14, and 16 are designated working slots. These slots are mapped to a set of 12 BNC connectors on the EIA. These slots can be used without protection for unprotected DS-3 access.

With 1:N or 1:1 protection, Slots 1, 3, 15 and 17 are designated for protection when BNC connectors are used. With 1:N protection, Slots 3 and 15 are also designated for protection when BNC connectors are used. Slots 5, 6, 12, and 13 do not support DS3-12 cards when you use the regular BNC EIA.

6.2.2 High-Density BNC Protection

When you use the high-density BNC EIA, the ONS 15454 supports 1:1 protection or 1:N protection for eight total working DS-3 electrical cards. If you are using EC-1 electrical cards with the high-density BNC EIA, the ONS 15454 supports 1:1 protection and a total of eight working cards. Slots 1, 2, 4, 5, 13, 14, 16, and 17 are designated working slots.

These slots are mapped to a set of 12 BNC type connectors on the EIA. You can use these slots without protection for unprotected DS-3 or EC-1 access. Slots 3 and 15 are designated for 1:N protection slots when you use BNC connectors with the high-density BNC EIA. Slots 6 and 12 do not support DS-3 or EC-1 cards when you use the high-density BNC EIA.

6.2.3 SMB Protection

When you use SMB connectors, the ONS 15454 supports 1:1 or 1:N protection for the DS-1 and the DS-3 electrical cards. If you are using EC-1 cards with the SMB EIA, the ONS 15454 supports 1:1 protection. Working and protection electrical cards are defined by card slot pairs (the same card type is used for working and protect modules; the protection of the card is defined by the slot where it is housed). Each slot maps to a set of 12 or 14 SMB connectors on the EIA depending on the number of ports on the corresponding card. Any slot can be used without protection for unprotected DS-1, DS-3, or EC-1 access.

The DS1N-14 card can be a working or protect card in 1:1 or 1:N protection schemes. When used with 1:N protection, the DS1N-14 card can protect up to five DS1-14 plug-ins using the SMB connectors with the DS-1 electrical interface adapters (baluns).

6.2.4 AMP Champ Protection

When you use AMP Champ connectors, the ONS 15454 supports 1:1 or 1:N protection for the DS-1 cards. The DS1N-14 card can be a working or protect card in 1:1 or 1:N protection schemes. When used with 1:N protection, the DS1N-14 card can protect up to five DS1-14 plug-ins using the AMP Champ EIA.

6.3 Optical Card Protection

With 1+1 port-to-port protection, any number of ports on the protect card can be assigned to protect the corresponding ports on the working card. The working and protect cards do not have to be placed side by side in the node. A working card must be paired with a protect card of the same type and number of ports. For example, a single-port OC12 must be paired with another single-port OC12, and a four-port OC12 must be paired with another four-port OC12. You cannot create a 1+1 protection group if one card is single-port and the other is multi-port, even if the OC-N rates are the same. The protection takes place on the port level, any number of ports on the protect card can be assigned to protect the corresponding ports on the working card.

For example, on a four-port card, you can assign one port as a protection port on the protect card (protecting the corresponding port on the working card) and leave three ports unprotected. Conversely, you can assign three ports as protection ports and leave one port unprotected.

With 1:1 or 1:N protection (electrical cards), the protect card must protect an entire slot. In other words, all the ports on the protect card will be used in the protection scheme.

1+1 span protection can be either revertive or nonrevertive. With nonrevertive 1+1 protection, when a failure occurs and the signal switches from the working card to the protect card, the signal stays switched to the protect card until it is manually switched back. Revertive 1+1 protection automatically switches the signal back to the working card when the working card comes back online.

You create and modify protection schemes using CTC software. For more information, refer to the *Cisco ONS 15454 Procedure Guide*.

6.4 Unprotected Cards

Unprotected cards are not included in a protection scheme; therefore, a card failure or a signal error results in lost data. Because no bandwidth lies in reserve for protection, unprotected schemes maximize the available ONS 15454 bandwidth. [Figure 6-3 on page 6-6](#) shows the ONS 15454 in an unprotected configuration. All cards are in a working state.

