

QX3440
SNCP-PDH Protection
A Time Slot 64kbps Protection

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SNCP-PDH Ring Protection A Time Slot 64kbps protection with QX3440 DACS

The QX3440 is providing 3 types of traffic protection:

- The MSP 1+1 protection for a full Framed or unframed E1 per another E1 locate in the adjacent E1 card
(This mode is supported by all E1/T1 cards:
E1, 3E1, 4E1, MQE1, T1, 4T1 and Fiber optic 4 E1)
- The ULSR Ring protection of a Framed E1, all working traffic is transmitted over one pair of the E1 link and the protection is transmitted over the codirectional pair of the E1
(This mode is supported by 4E1, MQE1, and Fiber optic 4E1 card)
- The SNCP-PDH Ring of Time Slot 64kbps over a QX3440 network.
(This mode is supported by 3E1 card card)

This SNCP-PDH Ring mode is protecting one or n TS between 2 PDH nodes QX3440 over a network of QX3440 PDH multiplexers using direct E1 links or VC12 SDH links

Each E1 link will be protected.

Bidirectional (a) or Unidirectional transmissions (b) choose:

(a) The traffic is sent together in the Working Path (WP) and Protection Path (PP). In order to avoid different transit times between the Co-directional traffic, the codirectional WP will use the same path and the codirectional PP will use the other path.

or

(b) All Working Path will send in one pair of E1 ring and all Protection Path will be send at the same time in the codirectional pair of the E1 ring. This choice could be more efficient in case the PDH link would be transported over a SDH ring in SNCP mode.

The following description will be developed in Bidirectional mode (a).

This SNCP-PDH solution is implemented in CPU software and support by QX3440-3E1 cards. This 3E1 card must be used along the WP and PP of the ring (in extremes nodes and in the traversed node).

In each node you can use one or two cards for WP E1 trunk and PP E1 trunk.

If 2 card are used you can provide in addition the 1+1 protection.

The other E1/4E1/MQE1 card can be used together in the same QX3440 for non SNCP protected traffic.



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For the explanation of this text we will use the following convention:

- The node R will be the node of concentration.
- We will analyse the protection of TS from node A to the concentration R over WP=A-B-C-D-R and PP=A-F-G-H-R.
- Then we will analyse in addition the protection of few TS from C to R over WPC=C-D-R and PPC=C-G-H-R
- AIS-E1 means an AIS over the clear-channel interface
- AIS-TS means an AIS over one TS only
- "Starting node" is the node requesting the protection,
"Ending node" is the node finishing the protection.
Interface to transport are located on both sides.
Because of codirectional traffic:
 - the Starting node is also the Ending node of the codirectional traffic and
 - the Ending node is the Starting node of the codirectional traffic.
- "Traversed nodes" are the node traversed by the SNCP-PHDRing paths.
- TS-WP are the TS to protect along the WP
- TS-PP are the TS of protection.
- TS-UI are the TS of the user interface



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Principle of working situation:

In Starting node:

- This node will multicast the TS-UI from the user interfaces (data or voice) in WP and PP.

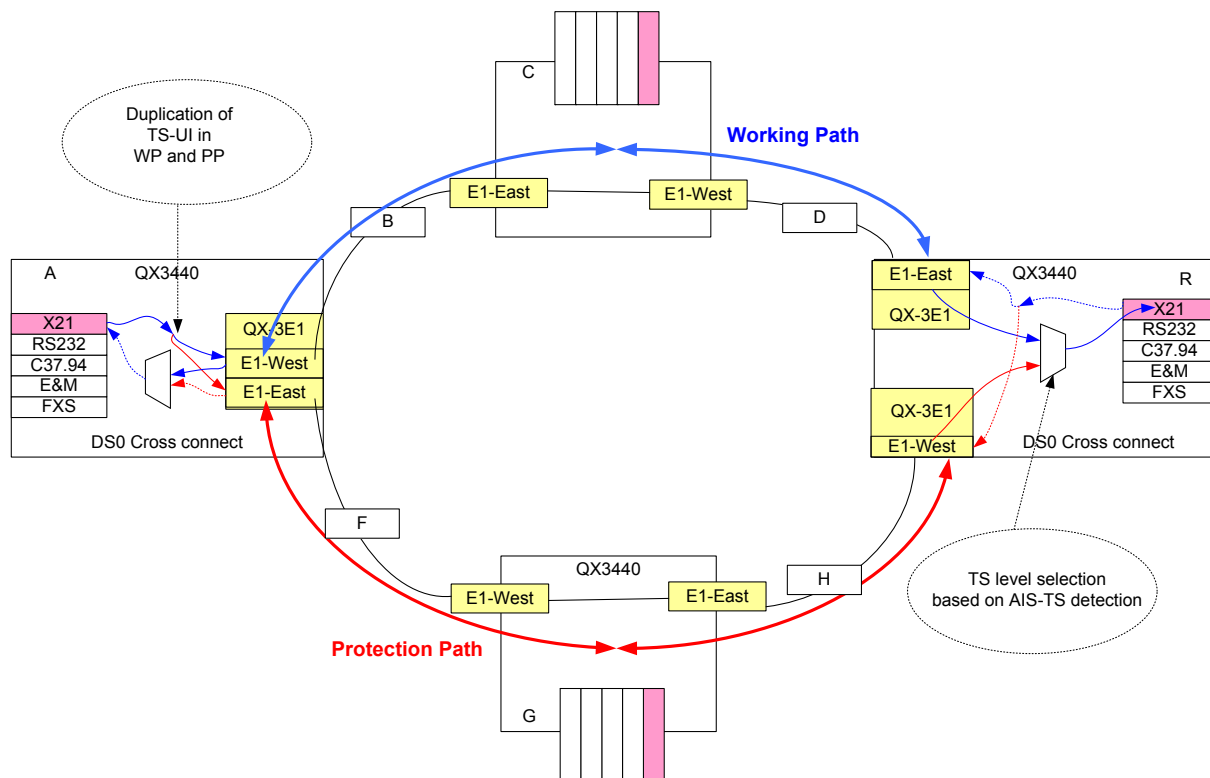
In Ending node:

- This node is set-up in multicast mode with a cross connect from TS-WP to TS-UI user interface and the E1 TS are set-up by the combination (TS-WP+TS-PP)
- The node will look at the validity of TS-WP (\neq AIS-TS) and forward this traffic to the receiving user interface (data or voice)

In Traversed Nodes:

These nodes need to be traversed over QX3440-3E1 interfaces. The multicast mode is not required.

Codirectional traffic (or reverse traffic) is using the same process in the invert side.





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Remarks

- Because of codirectional traffic, and AIS-TS is sending in both directions, the Starting Node (which is also the Ending Node of the reverse traffic) will switch the incoming traffic from TS-WP>>TS-UI to TS-PP>>TS-UI.
- If different protected traffics are concentrated in Node R (WPa, WPC), and if the event is only local to the WPa, then WPC will not switch.

Principle of restoring the normal situation:

In Traversed Nodes:

- The event from E1 interface will disappear
- The 3E1 and cross-connect will send again the codirectional traffics without AIS-TS

Ending Node:

- This node will detect the disappearance of AIS-TS in each TS-WP
- In case Automatic recovery is set-up for this TS, then the Cross-connect will switch the link from TS-PP>>TS-UI to TS-WP>>TS-UI after 2,5/3s.
- In case Manual recovery is set-up for this TS, then the Cross-connect will switch the link from TS-PP>>TS-UI to TS-WP>>TS-UI after an INMS, Telnet or local command.
- The node could generate a TRAP with the concerned TS-WPx Information
- The INMS will show the restoration of the failure

Principle of multiple SNCP-PDH Ring and other traffic.

In Starting Node, Ending Node and Traversed Nodes:

These nodes are transporting and cross-connecting together different WPx and PPy and unprotected Voice and Data traffics from node to node without constraint.

The switch of any WPx will not affect the other links, except if they are locate in the same E1 and if this E1 will break.



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How to insure that WP-TS is not corrupted.

In the E1 links:

In addition to the clear messages from the E1 interface AIS-E1, LOS and LOF, the QX3440-3E1 we will look permanently to an "Excessive bit error situation" and will send AIS-TS with one of these conditions after the time of analysis.

This last condition will avoid introducing corrupted TS in the next E1 bound.

In the QX3440 device.

In order to avoid a modification of the cross connect by an operator, the INMS will block the access to the Telnet or consol port. After a manual set-up by a local operator, the INMS operator must resynchronize the node to the database and will show the status of the WP+PP.

In the Cross-Connect of the QX3440:

The cross-connect has a self verification with permanent checksum of all connection.

I case of improbable mistake of the cross-connecting chipsets the CPU should block all traffic and will request the switch to the redundancy card with redundant cross-connect.