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What is the difference between 1+1 and 1:1 protection ?

Prelude

1+1 and 1:N are the protection switching schemes available for linear topology

1+1 protection architecture is defined in GR 253 as

" An architecture in which the head-end signal is continuously bridged (at the electrical level) to working and protection equipment so that the same payloads are transmitted identically to the tail-end working and protection equipment. At the tail end, the working and protection OC-N signals are monitored independently and identically for failures. The receiving equipment chooses either the working or the protection signal as the one from which to select the traffic, based on the switch initiation criteria ".

Because of the continuous head-end bridge, the 1+1 architecture does not allow an unprotected extra traffic channel to be provided. A system using the 1+1 architecture operates, as a default, in a unidirectional mode. In this mode, the switching is complete when a channel in the failed direction is switched to the protection line. Although head-end to tail-end signaling is not needed, the APS channel (which is carried in the K1 and K2 bytes of the signal on the protection line) is still used to indicate the local switch actions and the mode of operation.

A bidirectional switching mode may also be provided as a user-provisionable option. In this mode, a channel is switched to the protection line in both directions. Switching of only one direction is not allowed. Head-end to tail-end signaling is accomplished using the APS channel.

A 1+1 system also uses, as a default, nonrevertive switching. In nonrevertive switching, a switch to the protection line is maintained even after the working line has recovered from the failure that caused the switch, or the manual switch command is cleared. Revertive switching may also be provided as a user-provisionable option. In revertive switching, the traffic is switched back to the working line when the working line has recovered from the failure or the manual command is cleared.

The 1:n architecture is defined as follows:

An architecture in which any of the n working channels can be bridged to a single protection line. Permissible values of n are from 1 to 14. Head-end to tail-end signaling is accomplished by using the APS channel. Because the head end is switchable, the protection line can be used to carry an extra traffic channel. The 1:n architecture could be supported as either a user-provisionable option (i.e., with the 1+1 architecture as the other user-provisionable option) or as the only supported architecture.

In a 1:n system, all switching is revertive, and both unidirectional and bidirectional switching modes are provided. The mode of operation is user-provisionable, with bidirectional as the default. The 1:1 case is a subset of the 1:n architecture, with n equal to 1.

Note : Although nonrevertive switching is the default for the 1+1 architecture, it is not essential to the operation of a system for both ends to use nonrevertive switching (or for both to use revertive), and therefore the type of switching used locally is not indicated to the far end. Therefore, 1:1 LTE can use either revertive or nonrevertive switching when it is operating as 1+1 LTE.

Note : Abridging the post the main differences are as follows

a) 1+1 is non-revertive and 1:1 is revertive (These are defaults . GR 253 says that the switching can be made user provisionable during implementation)

b) In 1+1 traffic is continuously bridged (ie duplicate copy of the signal is send through the hot standby) at the add end and selected at the drop end. But in 1:1 , the traffic is send through the hot standby only when a fault occurs in active path and tail end indicates it to the head end.

c) The K1 and K2 bytes are used by far end to inform the near end regarding a failure so that the near end can start bridging the traffic to protection . To do this the tail end originates K1 with a reference to the working line number and the fault type (SD, SF etc). The head-end NE then checks the current status of the

protection system and the priority of the conditions (K1 bits 1-4) for each working system requesting protection. As per the K1 byte encoding , the maximum number of working channels is 14 plus one protection channel. The K1 byte encodes channel number zero to indicate protection line and fifteen to indicate extra traffic. Because 1:N protection has a protection line that is normally idle, it can be used to carry Extra Traffic.

posted by Cijo | [11:35 AM](#) 

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