NETWORK SURVIVABILITY: ANALYSIS OF PROTECTION SCHEMES IN RING CONFIGURATION

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Abstract - *This paper deals with network survivability and provides information about protection schemes based on ring configuration. The optical network should have the capability to function continuously even in case of any failure. As the capability of optical networks for transmitting a large amount of data is at very high speed, so even for small duration any failure or breakdown can cause data loss and revenue loss. Hence survivability of optical networks has become very important and for this protection schemes are required. The protection is usually implemented in a distributed manner without requiring centralized control in the network to ensure more efficient and reliable network survivability which ensures the fast restoration of the services if a failure will occur. There are various Protection schemes which are design to operate over a range of network topologies like ring topology, point to point topology. The ring topologies are more efficient so this paper provides the analysis of protection schemes.*

Key Words: – Network Survivability, protection schemes in ring configuration, self healing rings, UPSR, BLSR

1 INTRODUCTION

Network survivability is survival of network meaning the network should survive in every condition even during failure of a link, links or nodes and the survives which the network is providing should remain as it is even during failure. To ensure survivability protection switching is the key technique. These protection techniques include redundant capacity within the network and rerouting the traffic around the failure using redundancy. The protection is usually implemented in a distributed manner without requiring centralized control in the network to ensure more efficient and reliable network survivability which **ensures the fast restoration of the services if a failure will occur.**

2. RING CONFIGURATION

In this configuration a direct point- to- point link between two neighboring nodes form a ring structure which offers high performance for a small number of workstations or for large networks where each station has a similar workload. This configuration can easily extend if required. For network survivability there are various protection schemes which are used in ring configuration. The configuration which is mostly used is self healing rings.

2.1 Self Healing Rings

Ring networks are widely used in optical networks. A ring topology provides separate paths between the pair of nodes that do not have any common nodes or links except the source and destination node. So in a ring network is failure resistant. The rings in the Ring topology are called as self healing rings. This is because in these rings protection mechanism is incorporated. This automatically detects the failures and the traffic is rerouted away from the failed links or nodes onto the other routes.

2.2 Types of Architectures

(a) Unidirectional Path Switched Rings (UPSRs)

(b) Bidirectional Line Switched Rings (BLSR)

(a) UNIDIRECTIONAL PATH SWITCHING RING (UPSRs)

In UPSRs, one fiber is used as the working fiber and the other as the protection fiber. The traffic is sent simultaneously on the working fiber in the clockwise direction from node 1 to node 2.Node 2 continuously monitors both the working and the protection fiber and selects the better signal for each SONET connection. If link failure occurs then node 2 will switch over to the protection fiber and continue to receive the data.
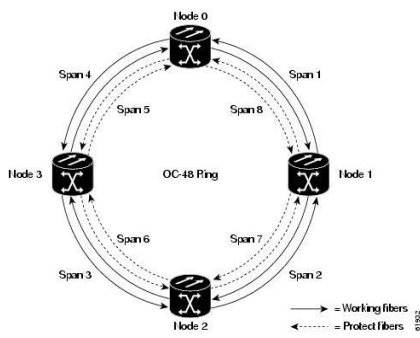
Fig 1: UPSRs

(b) BIDIRECTIONAL LINE SWITCHED RINGS (BLSRs)

In a BLSR there are two working fibers and the protection fibers respectively. Working traffic can be carried in both the directions along the ring. The shortest path is always preferred to route the traffic between two nodes.
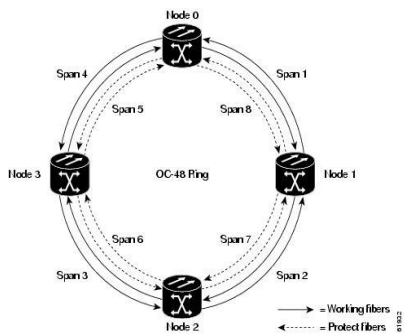

Fig 2: BLSRs

Table -1: Analysis between UPSR and BLSR

S.No.	Parameters	UPSR	BLSR
1.	Type of protection	Dedicated	Shared
2.	Capacity	Equal to working capacity	Equal to working capacity
3.	Number of fiber pairs	One	One/Two
4.	Speed	Fast	Slow
5.	Implementation	Simple	Complex
6.	Nodes for transmitter and receiver	Two	Two/Four
7.	Node Failure	Path Switching	Ring Switching
8.	Failure of Link	Path Switching	Ring Switching

3. CONCLUSIONS

This paper provides the analysis of protection schemes used in ring configuration for network survivability. In ring configuration self healing rings is mostly used which deals with two type of architecture UPSRs and BLSRs. As BLSRs are more efficient due to shared protection bandwidth and number of fiber pairs can vary from one to two as compared to UPSRs. Hence BLSRs protection schemes are preferred than ULSRs due to high efficiency.

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