

The Reality Of Transmission Infrastructure

Roy Bynum
IEEE 802.17

January, 2001

What Is The Transmission System Infrastructure?

The transmission infrastructure is:

- The physical fiber and copper cable plant
- The optical and electronic, digital and analog, equipment that encodes the signals on the fiber and copper cable plant
- The optical, electronic, and manual systems that interconnect the fiber and copper cable plant at specific bandwidth rates and sub-rates to be able to create logical point to point circuits
- The surveillance network and systems that do the operations, administration, maintenance, and provisioning of the fiber and copper cable plant, as well as manage and do the automatic restoration of circuits under fault conditions
- The Inter-Machine Trunks That Make Up The Provisionable Bandwidth Created By Interconnecting All Of The Fiber And Copper Plant And Support Systems

What Is Not The Transmission Infrastructure?

The Services,

That Run On The Transmission Infrastructure Are Not Actually Part Of the Transmission Infrastructure, Including ATM Services, Frame Relay Services, Voice Services, Internet Services, Private Line Services, Etc;

The Service Specific Systems,

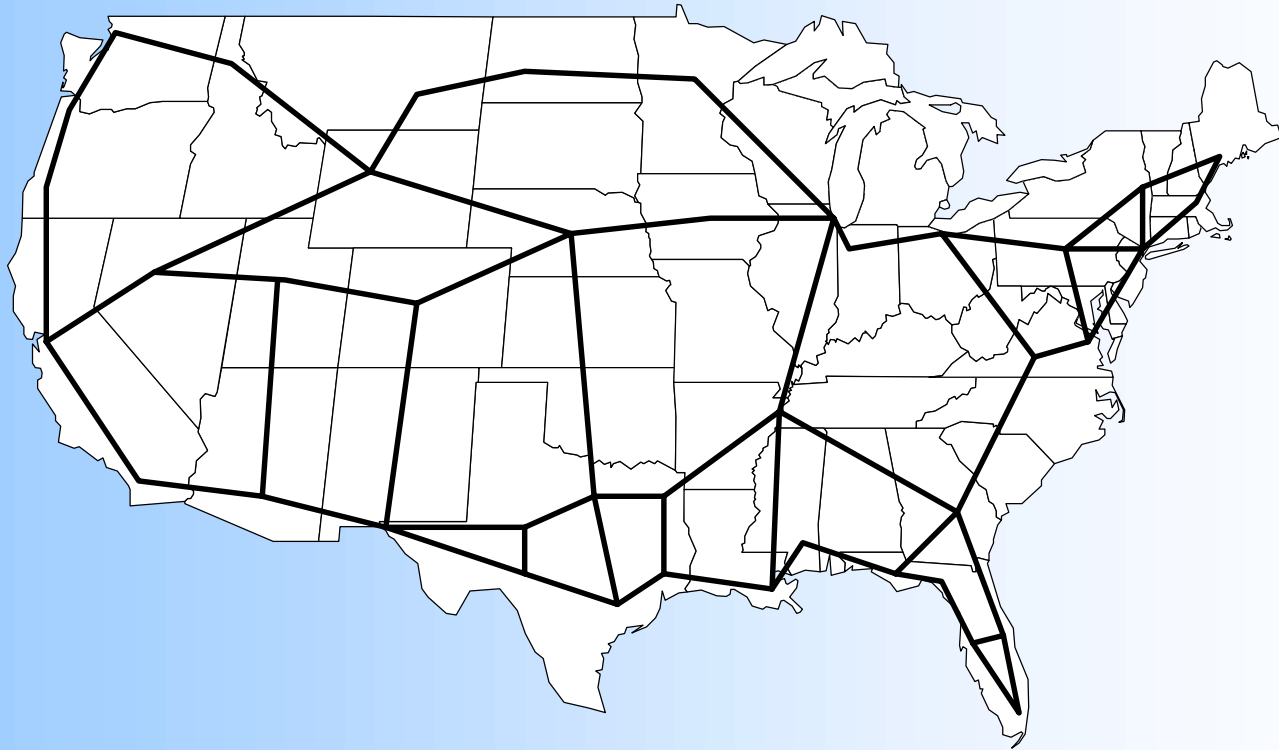
Such As Gateways, Routers, Switches, Etc, That Enable, Administer, Provision, Maintain, And Create Performance and Billing Records Specific To Specific Services Are Not Part Of The Transmission Infrastructure;

The Back Office Systems,

And Software That Enables, Manages, Supports and Bills for Billable Services, Are Not Part Of The Transmission Infrastructure;

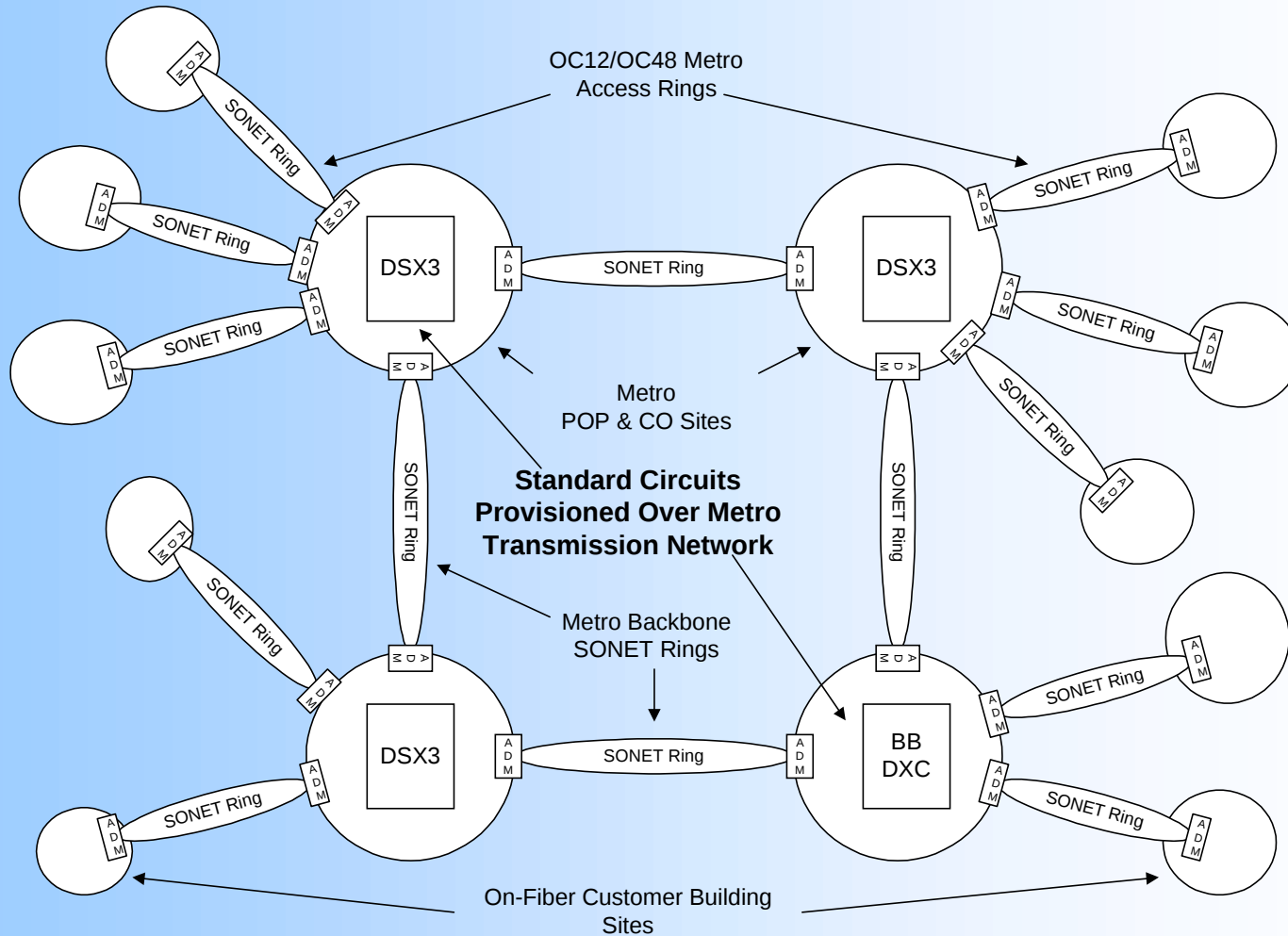
All Of These Are Parts Of The Service Infrastructure That Sits On Top Of the Transmission Infrastructure

All Services Are Provisioned Over The Same Inter-Machine Trunks



The same people that provision private line services provision the bandwidth for other services over the same facilities that is used for point to point private line services.

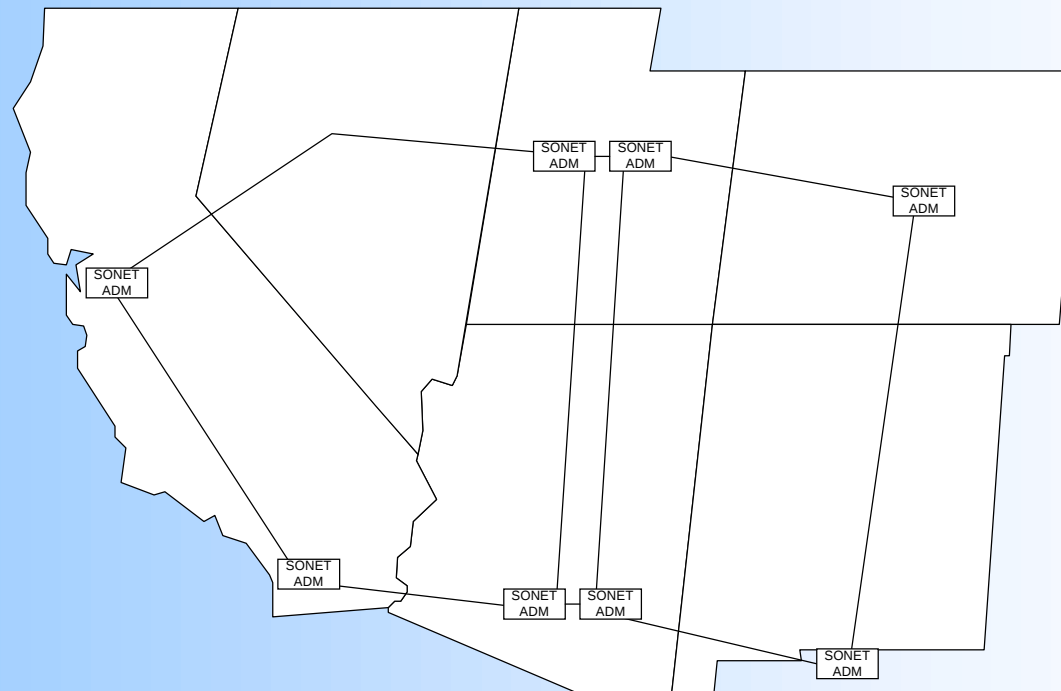
SONET/SDH Metro Access Favors A Mesh Of Two Node Rings Instead Of Multi-Node Rings



Why A Mesh Of Rings In Access?

- SONET/SDH Rings Are Used Because Of The High Speed Of Restoration In Case Of a Fiber Cut.
- The SONET/SDH transmission protocol is used because it provides the needed operations, administration, maintenance, and provisioning (OAM&P) functionality needed by service providers to support large scale networks.
- Two Node SONET/SDH rings are used because of the ability to do operational maintenance on transmission systems without effecting more than one site.
- Multi-Node rings are not used because any upgrade that is done to one access site requires upgrade to all of the systems on the ring instead of only the site that needs it.
- The cost of building four two node OC48 rings is about half of the cost of building a single five node OC192 ring.
- A mesh is used because of the ease and simplicity of provisioning individual circuits to support various services.

SONET/SDH Multi-Node Rings Are More Often Used In Long Haul Backbone Transport Infrastructure



Multi-Node SONET/SDH Rings Cost More Than Mesh Networks
But Provide Faster Restoration
Where Traffic Restoration Over Distances Is More Of An Issue.

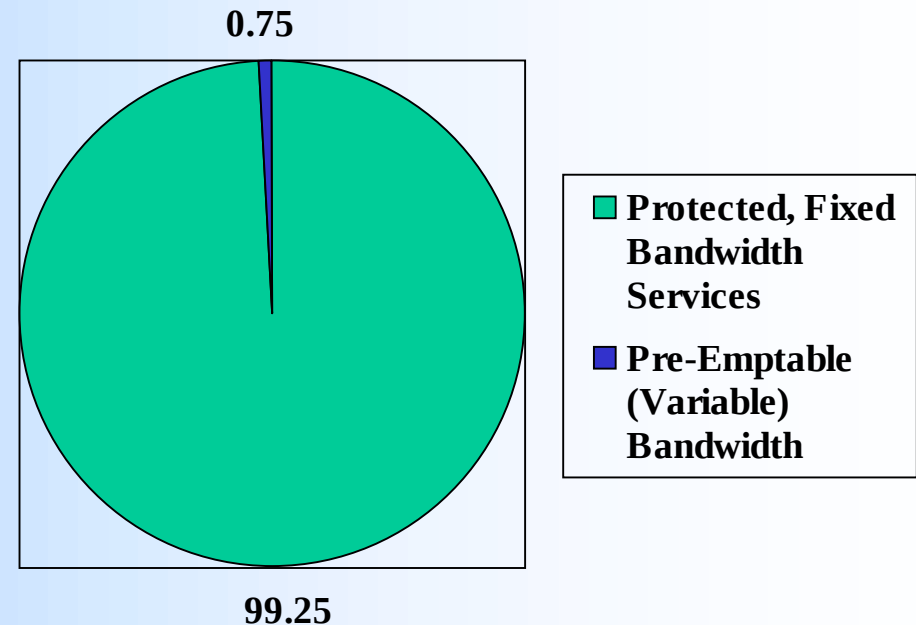
What Are “Private Line” and “Virtual Private Line” Services

“Private Line” services are billable, physically (TDM) segregated point to point circuits, that are directly provisioned into segregated bandwidths in the inter-machine trunks on the transmission infrastructure; DS1/DS3.

“Virtual Private Line” services are billable, virtually segregated point to point circuits, that are carried over (“encapsulated”, “tunneled”) common shared bandwidths provisioned in the inter-machine trunks on the transmission infrastructure; Frame Relay, ATM.

What Is The Actual Pre-Emptable (Variable) Bandwidth Services Market Versus The Fixed Bandwidth Services Market

The actual bandwidth that is billed as “0 Committed Information Rate” Is Less Than 1% Of The Overall Transport Bandwidth Market. This would be the market for traffic that is provisioned over the “Protection Traffic” of ring topologies.



Even Internet Access and Backbone Services Run Over Provisioned Fixed Bandwidth Point Circuits On The Transmission Infrastructure

Given The Reality Of Transmission Infrastructure, What Will 802.17 As Transmission Infrastructure Need To Be?

The 802.17 protocol needs to work over mesh topologies as well as ring.

802.17 will need to have the same level of OAM&P functionality as SONET/SDH

Services provisioned over 802.17 will be “Virtual Private Line”.

The provisioned services on 802.17 will need to provide the same level of protection for fixed bandwidth over transmission infrastructure. The economic benefit of 802.17 can not depend on using the “protection traffic” of the access ring.