ORIGINAL

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BEFORE THE FLORIDA PUBLIC SERVICE COMMISSION

REFILED DIRECT TESTIMONY

OF

TALMAGE O. COX, III

Q. Please state your name, business address, employer and current position.

A. My name is Talmage O. Cox, III. My business address is 901 East 104th Street, Kansas City, Missouri, 64131. I am employed as Manager of Service Cost for Sprint/United Management Company. I am testifying on behalf of Sprint-Florida, Inc. and Sprint Communications L.P. (hereafter referred to as "Sprint").

Q. What is your educational background?

A. I received an Associate in Arts Degree from National Business College, Roanoke, Virginia, in 1977 with a major in Business Administration -- Accounting. Subsequently, I received a Bachelor of Science Degree from, Tusculum College - Greeneville, Tennessee, in 1986 with a major in Business Administration.

Q. What is your work experience?

A. I have worked for Sprint since 1978. Prior to my current position, I have held several positions with Sprint in costing. I developed cost studies and methodology associated with various services and special projects for state jurisdictional filings in Tennessee, and Virginia. While working in this position I was the Telecordia Switching Cost Information System (SCIS) Administrator for ten years responsible for coordinating model questions with Telecordia and assisting other users when needed. For the past four years, in my current position I have primary responsibility for developing the costing methodology and the module for interoffice transport associated with Sprint's Unbundled Network Element (UNE) transport cost module as well as the transport module contained in proxy cost models.

Q. Have you previously testified before other Public Utility Commissions?

A. Yes. I have previously testified before state regulatory commissions in Kansas and Texas.

Q. What is the purpose of your Testimony?

A. To respond to the following Tentative List of Issues (Appendix A) from the second revised order on procedure in reference to the Investigation Into Pricing of Unbundled Network Elements in Docket No. 990649-TP: Issues 7(n) and 7(r).

Q. What does the FCC say about unbundled interoffice transmission facilities?

A. FCC Rule 51.319 (d) defines unbundled Interoffice Transmission Facilities "… as incumbent LEC transmission facilities dedicated to a particular customer or carrier, that provide telecommunications between wire centers owned by incumbent LECs or requesting telecommunications carriers, or between switches owned by incumbent LECs or requesting telecommunications carriers."

The unbundled Interoffice Transmission Facilities element, or simply "transport", is composed of the two basic network components: terminals and fiber cable. Terminals are the equipment housed at the central office locations, which serve as entry and exit points for telecommunications traffic to be moved between interoffice points in the network. In the majority of today's transport networks and certainly in a forward-looking network, these interoffice terminals will be optically capable. Additionally, the fiber transport routes in a forward-looking network are constructed in ring design, which provides diverse routing capability in the event of a fiber cable cut, or terminal node failure. This forward-looking transport network design is commonly referred to as survivable SONET ring technology.

Q. What does the FCC 96-325 First Report and Order say about the unbundling of transmission facilities?

A. FCC 96-325, First Report and Order, Paragraph 440, States,

> "We require incumbent LECs to provide unbundled access to shared transmission facilities between end offices and the tandem switch. Further, incumbent LECs must provide unbundled access to dedicated transmission facilities between LEC central offices or between such offices and those of competing carriers. This includes, at a minimum, interoffice facilities between end

offices and serving wire centers (SWCs), SWCs and IXC POPs, tandem switches and SWCs, end offices or tandems of the incumbent LEC, and the wire centers of incumbent LECs and requesting carriers. The incumbent LEC must also provide, to the extent discussed below, all technically feasible transmission capabilities, such as DS1, DS3, and Optical Carrier levels (e.g. OC-3/12/48/96) that the competing provider could use to provide telecommunications services. We conclude that an incumbent LEC may not limit the facilities to which such interoffice facilities are connected, provided such interconnection is technically feasible, or the use of such facilities. In general, this means that incumbent LECs must provide interoffice facilities between wire centers owned by incumbent LECs or requesting carriers, or between switches owned by incumbent LECs or requesting carriers. For example, an interoffice facility could be used by a competitor to connect to the incumbent LEC's switch or to the competitor's collocated equipment."

ISSUE 7: What are the appropriate assumptions and inputs for the following items to be used in the forward-looking recurring UNE Cost Studies?

(n) Terminal Costs;

Q. What are the appropriate assumptions associated with the development of terminal cost inputs?

A. The terminal cost inputs should recognize the following key assumption items:

- Terminal Cost Based on ILEC Specific Data
- Utilize Forward Looking Technology
- Optical Based Transmission Equipment Costs Only
- Capable of Costing OC3, OC12, and OC48 Transport Rings Individually
- Reflect the Use of LEC's Existing Wire Centers
- Include the Cost Associated with Survivability

More specific the terminal cost should be developed by terminal bandwidth (OC3, OC12, OC48) and should include all of the common components required to make it operational. This would include the following components; relay racks, shelves, line interface, common shelf processor, trib shelf processor, receive/transmit access module, tributary transceiver, line shelf power supply, common shelf power supply, ring controller, synchronizer card, USI-LAN interface, software, cables, cover, DS3 switch, transmitters, craft interface equipment and software, and common complement of spare equipment. In addition to the above common equipment, additional line or drop interface equipment will be required for the hand off of DS1's, DS3's, OC3's and OC12's.

(r) Transport System Costs and Associated Variables;

Q. What network components should be included in the development of transport system costs?

A. The development of interoffice transport system costs for UNE's should include all of the direct cost components required for the service to be fully functional. The transport system cost inputs should utilize/recognize the following items:

- Fiber optic cable
- Fiber tip cable
- Fiber patch panel

- Fiber optic terminals (OC-3, OC-12, and OC-48)
- OC-3 cards
- OC-12 cards
- DS-3 cards
- DS-1 cards
- Installation cost
- Capacity
- Utilization factors
- Pole and conduit factors
- Annual charge factors
- Aerial, buried, underground mix

Q. Should traffic volume (Associated Variables) be considered in the development of transport costs?

A. Yes. The largest single determinant in the unit cost of a DS1, DS3, OC3 or OC12 transport circuit, is the volume of telecommunications traffic transmitted over a specific transport route. This volume of traffic, or demand, determines both the appropriate capacity sizing of the terminal equipment and fiber cable. Additionally, it defines the units over which these costs are spread. In cost determination, this basic principle is referred to as utilization. As volumes of traffic vary across specific transport routes, so does the sizing and utilization of terminals and fiber cable, and ultimately the resulting unit costs. This concept is illustrated in a series of Exhibits to this testimony.

Q. Should terminal bandwidth OC3, OC12, OC48 (Associated Variables) be considered in the development of transport costs?

A. Yes. Looking first at Exhibit TOC-1, it shows the decrease in DS1 unit costs as larger terminals are deployed. This analysis indicates that as traffic volumes or demand increases, larger terminals with increased capacity are used. Use of larger terminals associated with increased traffic volume results in greater economies and lower unit costs. This same relationship of increased demand driving down unit costs is also illustrated in Exhibit TOC-2, which shows the decreases in DS1 unit costs as demand, and therefore terminal utilization, increases.

A basic characteristic of fiber cable is that the volume of traffic that can be carried over fiber is a function of the optical terminal's bandwidth/capacity (OC3, OC12, OC48) placed on the fiber ring. From this basic principle, it follows that the same traffic volume that drives the unit cost of the terminals is also a major determinant in the transport unit cost of the fiber. The same relationship exists for fiber as terminals, in that the more traffic that a specific transport route carries, the lower the unit cost of DS0, DS1, DS3, OC3 or OC12 on that route.

Q. Should distance (Associated Variables) be considered in the development transport costs?

A. Yes. It is obvious that as the distance around a transport ring increases, more fiber cable must be placed, thereby increasing the cost of bandwidth on that ring. The impact of increasing distance on DS1 unit cost is illustrated on Exhibit TOC-3. Related to the impacts of distance on transport unit costs is the fact that as distance increases the likelihood for needing multiple survivable SONET rings to connect the two network end points increases. Exhibit TOC-4 illustrates the increases in unit cost that result from using multiple rings to transport traffic between two points. The potential use of multiple rings to transport traffic between certain end offices is unavoidable due to ultimate capacity constraints of terminal equipment and the need to construct fiber rings that link the predominant communities which originate and terminate the largest volumes of traffic on any given ring. Two communities with a relatively smaller need (i.e. volume) for transporting traffic between themselves would normally not exist on the same ring. Therefore, in order to transport the relatively lower volumes of traffic between these two communities, multiple ring connections are required.

In summary, unbundled transport unit costs vary between specific geographic points due to the underlying variances in the traffic volumes, distances and ring designs that commonly occur in the network. In order to properly estimate the geographic-specific forward-looking cost of unbundled transport facilities, the impact of these geographic-specific factors must be considered.

Q. What is the difference between point-to-point and fiber ring transmission systems?

A. Fiber ring technology represents the current state-of-the-art transport design. The most significant characteristic is the use of fiber rings, rather than point-to-point connections, which provide route diversity. Should the cable making up part of the ring be broken, traffic is automatically rerouted over the remainder of the ring. Ring technology has become the industry standard technology, such that asynchronous point-to-point systems can no longer be purchased from vendors.

Q. What does the FCC Order say about fill factors?

A. FCC 96-325, First Report and Order, Paragraph 682 states,

> "Per-unit costs shall be derived from total costs using reasonably accurate "fill factors" (estimates of the proportion of a facility that will be "filled" with network usage); that is, the per-unit costs associated with the element must be derived by dividing the total cost associated with the element by a reasonable projection of the actual total usage of the element."

Q. Please describe what is meant by "reasonably accurate fill factors" (FCC Order Paragraph 682).

A. Fill or utilization factors are the percentage of available network capacity actually used. Utilization is due to three factors.

1. When engineering and building telecommunications facilities, LECs attempt to anticipate future needs. For example, it is more cost-effective to dig a trench once and install additional facilities, than to dig up the trench and install new facilities every time a new loop is required.

2. It is the nature of the telecommunications industry that capacity is acquired in large blocks. Additional capacity will exist while demand grows into the available capacity.

3. An engineering interval, a period of time necessary to plan and construct facilities, is required when replacing or expanding capacity.

Efficient deployment balances the cost-benefit relationship of unused capacity and the cost of installation. Not enough capacity results in inefficient rework (e.g. digging new trenches every month); too much capacity is an inefficient use of resources (e.g., burying plant that will never be used).

Q. Is the use of a theoretically high, optimal utilization factor appropriate for telephone companies?

A. No. This is in large part due to the nature of transmission capacity. For example, an OC-3 system has the capacity of 3 DS3s. An OC-12 system has the capacity of 12 DS3s. When an OC-3 system is exhausted and replaced with the larger OC-12 system, its maximum utilization at the time of cutover is only 25% (3 DS3s / 12 DS3s). In reality, the cutover takes place prior to absolute exhaustion, so the actual utilization at cutover must be less than 25%.

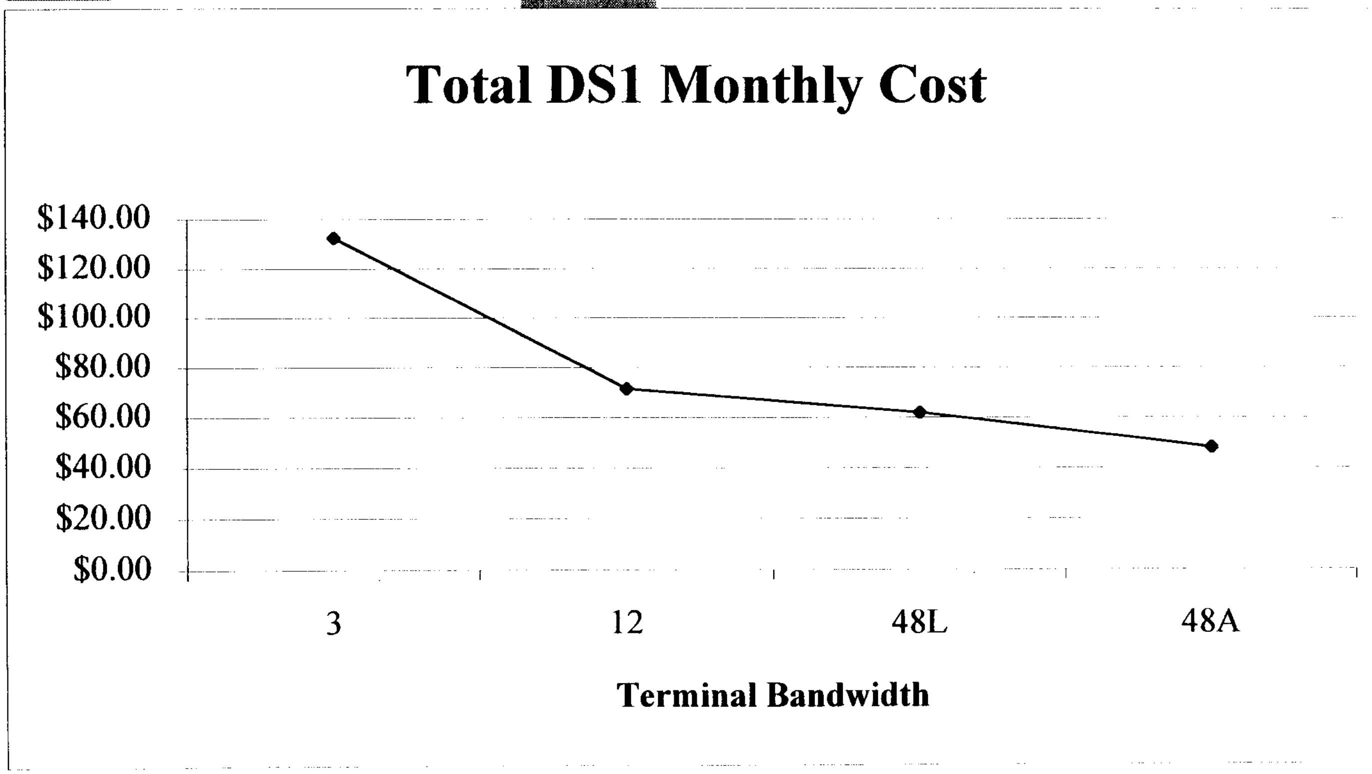
The same phenomenon occurs when cutting over from an OC-12 to an OC-48 system.

Q. Does this conclude your testimony?

A. Yes.

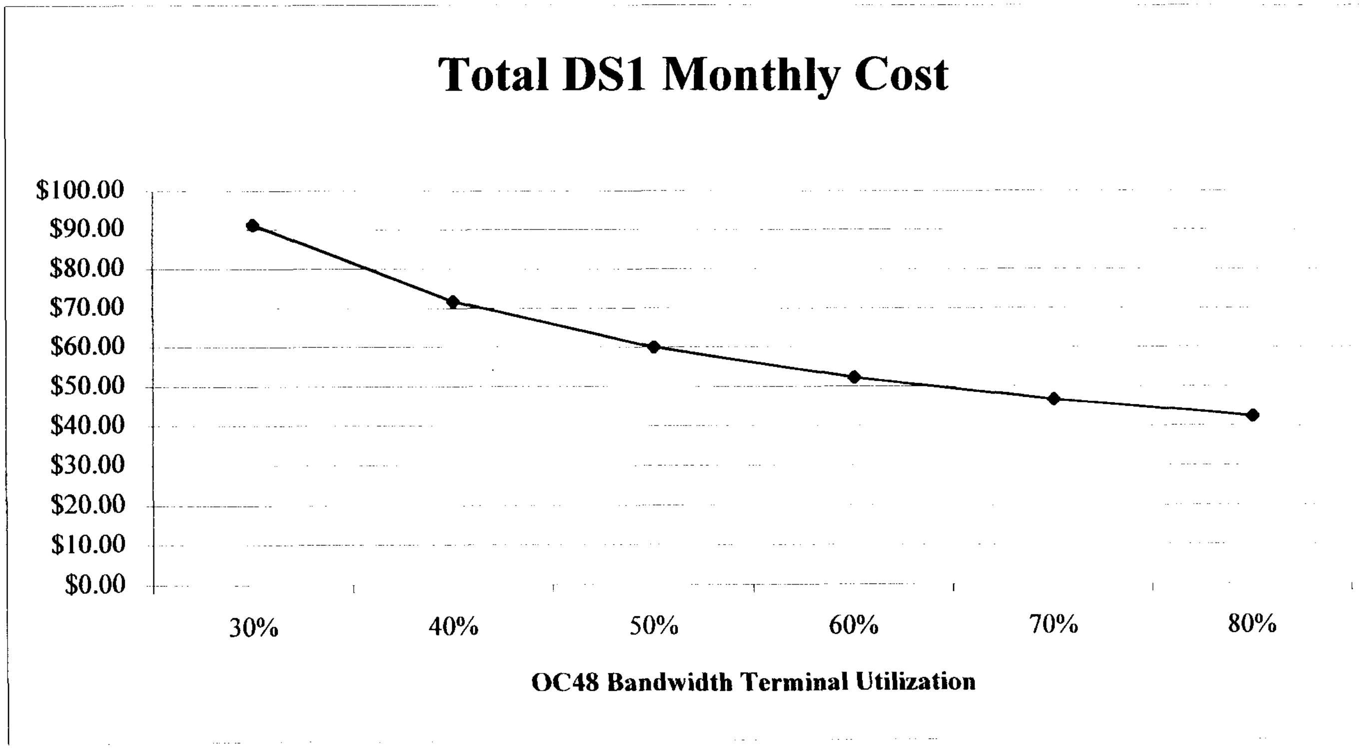
Florida
Sprint - Transport Cost Model - DS1 Summary
Sensitivity Analysis

A	B	C	D	E	F	G	H	I	J	K	L
Ring Name	[redacted]	# of Terminals	Ring Type	Number of DS1 Terminations	Terminal Util. Factor	Monthly Single Termination Cost	Total Route Miles	Monthly Total Transit Cost	Single Termination Cost MOU	Transit Cost MOU	DS1 Cost
AAA1-BBB1	[redacted]	3	S	2	0.67	$20.64	30	$91.23	0.000096	0.000422	$132.51
AAA2-BBB2	[redacted]	3	S	2	0.67	$24.33	30	$22.81	0.000113	0.000106	$71.47
AAA3-BBB3	[redacted]	3	S	2	0.67	$25.23	30	$11.40	0.000117	0.000053	$61.86
AAA4-BBB4	[redacted]	3	S	2	0.67	$20.92	30	$6.25	0.000097	0.000029	$48.09



Florida
Sprint - Transport Cost Model - DS1 Summary
Sensitivity Analysis

A	B	C	D	E	F	G	H	I	J	K	L
Ring Name	Type Term	# of Terminals	Ring Type	Number of DS1 Terminations	Terminal Utilization Factor	Monthly Single Termination Cost	Total Route Miles	Monthly Total Transit Cost	Single Termination Cost MOU	Transit Cost MOU	DS1 Cost
AAA7-BBB7	48A	3	S	2	30%	$38.64	30	$13.95	0.000179	0.000065	$91.23
AAA8-BBB8	48A	3	S	2	40%	$30.62	30	$10.47	0.000142	0.000048	$71.71
AAA9-BBB9	48A	3	S	2	50%	$25.80	30	$8.37	0.000119	0.000039	$59.97
AAAx-BBBx	48A	3	S	2	60%	$22.59	30	$6.98	0.000105	0.000032	$52.16
AAAy-BBBy	48A	3	S	2	70%	$20.30	30	$5.98	0.000094	0.000028	$46.58
AAAz-BBBz	48A	3	S	2	80%	$18.58	30	$5.23	0.000086	0.000024	$42.39

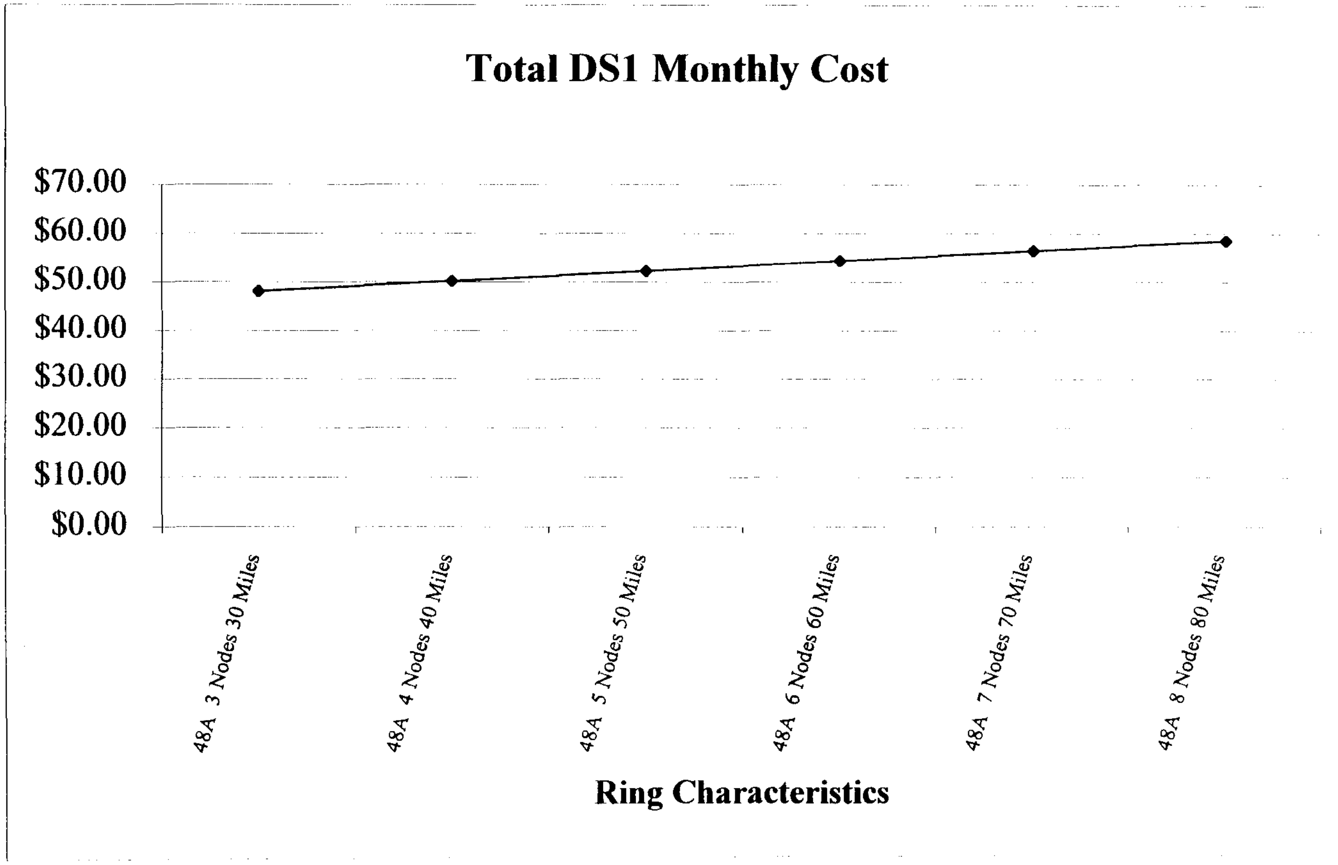


Florida

Sprint - Transport Cost Model - DS1 Summary

Sensitivity Analysis

A	B	C	D	E	F	G	H	I	J	K		
Ring Name	Type Term	# of Terminals	Ring Type	Number of DS1 Terminations	Terminal Util. Factor	Monthly Single Termination Cost	Total Route Miles	Monthly Total Transit Cost	Single Termination Cost MOU	Transit Cost MOU	DS1 Cost	DS1 Cost Characteristics
AAAA-CCC1	48A	3	S	2	0.67	$20.92	30	$6.25	0.000097	0.000029	$48.09	48A 3 Nodes 30 Miles
AAAA-CCC2	48A	4	S	2	0.67	$20.92	40	$8.33	0.000097	0.000039	$50.17	48A 4 Nodes 40 Miles
AAAA-CCC3	48A	5	S	2	0.67	$20.92	50	$10.41	0.000097	0.000048	$52.25	48A 5 Nodes 50 Miles
AAAA-CCC4	48A	6	S	2	0.67	$20.92	60	$12.50	0.000097	0.000058	$54.34	48A 6 Nodes 60 Miles
AAAA-CCC5	48A	7	S	2	0.67	$20.92	70	$14.58	0.000097	0.000067	$56.42	48A 7 Nodes 70 Miles
AAAA-CCC6	48A	8	S	2	0.67	$20.92	80	$16.66	0.000097	0.000077	$58.50	48A 8 Nodes 80 Miles



Florida
Sprint - Transport Cost Model - DS1 Summary
Sensitivity Analysis

A	B	C	D	E	F	G	H	I	J	K	L		
Ring Name	Type Term	# of Terminals	Ring Type	Number of DS1 Terminations	Terminal Utilization Factor	Monthly Single Termination Cost	Total Route Miles	Monthly Total Transit Cost	Single Termination Cost MOU	Transit Cost MOU	1 Ring DS1 Cost	2 Ring DS1 Cost	3 Ring DS1 Cost
AAA7-BBB7	48A	3	S	2	30%	$38.64	30	$13.95	0.000179	0.000065	$91.23	$182.46	$273.69
AAA8-BBB8	48A	3	S	2	40%	$30.62	30	$10.47	0.000142	0.000048	$71.71	$143.42	$215.13
AAA9-BBB9	48A	3	S	2	50%	$25.80	30	$8.37	0.000119	0.000039	$59.97	$119.94	$179.91
AAAx-BBBx	48A	3	S	2	60%	$22.59	30	$6.98	0.000105	0.000032	$52.16	$104.32	$156.48
AAAy-BBBy	48A	3	S	2	70%	$20.30	30	$5.98	0.000094	0.000028	$46.58	$93.16	$139.74
AAAz-BBBz	48A	3	S	2	80%	$18.58	30	$5.23	0.000086	0.000024	$42.39	$84.78	$127.17