

Applicant Name: Merit Network, Inc.

EasyGrants Number: 153

Organization Type (from Question 1D on BTOP application): Non-Profit Corporation

Proposed Period of Performance: 1/12/10 through 1/11/13

Total Project Costs: \$ 41,611,526

Total Federal Grant Request: \$33,289,221

Total Matching Funds (Cash): \$8,322,305

Total Matching Funds (In-Kind): \$

Total Matching Funds (Cash + In-Kind): \$8,322,305

Total Matching Funds (Cash + In-Kind) as Percentage of Total Project Costs: %20

1. Administrative and legal expenses

• \$1,836,009

- \$68,704, 16% of this category, includes pre-award expenses for a grant writer, writing assistant, accountants, research assistants, and travel expense to two of the Stimulus seminars. The regular staffing costs are taken directly from timesheets and travel expenses are from the airline and hotel invoices. The hourly rate and fringe benefit costs utilized are the same as their rounded, on-going rates, no adjustments were made for corporate overhead. Consultants (the grant writer and the writing assistant) submitted timesheets and were hired at a set hourly rate and FICA charges. All timesheets were reviewed and signed by managers for appropriateness.
- The following table lists all hours and rates for these expenses:



Pre Award Expense							
<u>Staff</u>	<u>Hours</u>	<u>Rate*</u>			<u>Cost</u>		
Research	16	\$	16	\$	256		
Research	126	\$	22	\$	2,753		
Research	2	\$	31	\$	62		
Research	5	\$	31	\$	155		
Research	3	\$	34	\$	103		
Research	17	\$	41	\$	692		
Research	45	\$	55	\$	2,493		
Research	26	\$	65	\$	1,697		
Research	102	\$	88	\$	8,928		
Admin	78	\$	34	\$	2,618		
Admin	25	\$	38	\$	939		
Admin	145	\$	66	\$	9,516		
Admin	63	\$	128	\$	8,058		
Consultant	116	\$	16	\$			
Consultant	266	\$	102	\$	27,132		
Travel 1	Minne	аро	lis	\$	523		
Travel 2	Los An	•		\$	906		
		-	tal		68,704		
* Rounded to th	he neares	t dol	llar, inclu				
standard corpo							

- \$353,325 in this category is for an administration grant specialist to be hired during the project period to handle mandated compliance requirements, project time keeping, invoicing, project related financials, and serve as an assistant to the project managers. The estimated salary for this position is \$44/hour and the fringe benefits are estimated at 28.5% (standard for this pay rate within the corporation). It is expected that this will be a 40 hour per week position and will be entitled to all standard benefits offered by the corporation. Merit Network, Inc. has utilized grant administrators over the course of its history and is very familiar with the going rates. This position will be limited to the duration of the project.
- \$1,390,480 includes five Merit staff positions: a project manager, statistical engineer, and three network engineers. These positions are not contractual. The staffing will be utilized for network and optical transport equipment configuration, installation, provisioning and testing of system. This also includes fiber testing using optical testing equipment by operations engineering staff and travel. Travel for the engineering team is estimated at \$34,525 over three years and is based upon current experience of traveling within the state, hotel rates, mileage reimbursement at 0.55/mile, average distance traveled per month for prior fiber builds.
- Rates are based upon similar or current salaried positions within the corporation and the standard fringe benefit package. Time and costs are based upon Merit's experience in implementing an optical and IP network. These positions are fulltime and will continue after the project is completed (except for the consultant).
- The standard fringe benefit package includes Merit's portion of FICA, health insurance and dental insurance, group insurance, retirement plan, long-term disability, and 1.9% for the University of Michigan's

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administration of the benefit programs. The average cost for this program is \$0.285 per dollar of salary. Once an hourly estimate for salary was established for each position the hourly salary was then increased by 28.5% to cover the fringe benefit package. The rate for each position includes salary and this fringe benefit amount only. No other costs were added to the rates. The 28.5% does not include any other indirect or direct costs, (i.e.) overhead, facilities, general or administrative costs, etc. nor were any of these costs added to the proposal.

Project Engineering Staff						
Staff	Hours/Yr	# of Yrs	Rate*	Total Cost		
Project Manager	2080	3	\$45/hr	\$	282,675	
Statistical Engineer	2080	3	\$44/hr	\$	274,560	
Netw ork Engineer	2080	3	\$43/hr	\$	268,320	
Netw ork Engineer	2080	3	\$43/hr	\$	268,320	
Netw ork Engineer	2080	3	\$42/hr	\$	262,080	
Travel				\$	34,525	
			Total	\$	1,390,480	
* Rounded to the nea	arest dollar,	includes				
standard corporate f	fringe benefi	it rate.				

• Below is a table listing the project engineering positions, rates, and hours:

- Lawyer expense is estimated at \$23,000 for construction contract review and is based on the average legal cost per mile (\$24) Merit has experienced with fiber construction. It also includes \$500 for legal work during the pre-award stage.
- All expenses are to be 20% supported by cash matching funds.

2-9 Note

REACH-3MC will primarily use fiber contractors for the majority of the work defined in the ARRA broadband infrastructure proposal. Since the proposal will be leveraging contractors Merit consulted with them on the allocation of costs for Form 424C. The contractors recommend the following allocations for the fiber construction part of the project.

	Recommendation	Used
Land, structure, right of ways, appraisals, etc.	2%	2%
Architectural and engineering fees	10%-15%	13%
Project inspection fees	5%	5%
Site work	5%	5%
Construction	70%-75%	75%

Merit applied the percentages to the fiber construction costs recommended by the construction companies. Merit then added the remaining costs of the project that did not apply to the fiber contractors.

OUTSIDE PLAI	Unit Cost	# Units	\$ 33,809,950	
	Fiber Build 72 Strands	\$34,500	706.3	\$24,367,350
Cables	Fiber Build 36 Strands	\$32,800	173.9	\$5,703,920
	Fiber Build 12 Strands	\$28,750	74.9	\$2,153,375
	Central Office Access	\$25,000	8	\$200,000
Cables	Central Office Access	\$35,000	7	\$245,000
	Central Office Wiring Materials	\$95,105	1	\$95,105
	Anchor Tenant Access	\$30,000	25	\$750,000
Poles		\$1,550	144	\$223,200
Other	Hang Tags	\$3	28,800	\$72,000

The following aggregated information pertains to budget categories 2 is	2 through 9:
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Cables

- ✓ 72 strand fiber armored bundle to be installed on existing utility poles and underground conduit where required. Fiber specifications will require operation in the C-Band transmission window with non-zero chromatic dispersion to facilitate dense wave division multiplexing (DWDM) for high capacity systems. Consultation with two fiber vendors established that the cost of the fiber installation will average \$34,500 per mile with the total number of miles being 706.3. The route miles were determined using Merit's route mapping tool.
- ✓ 36 strand fiber armored bundle to be installed on existing utility poles and underground conduit where required. Fiber specifications will require operation in the C-Band transmission window with non-zero chromatic dispersion to facilitate dense wave division multiplexing (DWDM) for high capacity systems. Consultation with two fiber vendors established that the cost of the fiber installation will average \$32,800 per mile with the total number of miles being 173.9. The route miles were determined using Merit's route mapping tool.
- ✓ 12 strand fiber armored bundle to be installed on existing utility poles and underground conduit where required. Fiber specifications will require operation in the C-Band transmission window with non-zero chromatic dispersion to facilitate dense wave division multiplexing (DWDM) for high capacity systems. Consultation with two fiber vendors established that the cost of the fiber installation will average \$28,750 per mile with the total number of miles being 74.9. The route miles were determined using Merit's route mapping tool.

Central Office Access

✓ Central office access to 8 of the more rural proposed central offices is estimated to cost \$25,000 per site based upon experience and estimates from the vendors. The access includes fiber and conduit entrance into the facility. Also included is site preparation and collocation such as rack and power installation. Each central office will have diverse attachments to the outside plant infrastructure.

- ✓ Central office access to 7 of the more urban proposed central offices is estimated to cost 35,000 per site based upon experience and estimates from the vendors. The access includes fiber and conduit entrance into the facility. Also included is site preparation and collocation such as rack and power installation. Each central office will have diverse attachments to the outside plant infrastructure.
- ✓ Wiring materials to connect project central office equipment to the local ILEC and outside plant infrastructure. Includes low voltage copper, fiber, and power cabling. Cost from equipment vendor for the TDM central office equipment.
- ✓ General installation and wiring for central office equipment. This is from equipment quote from vendor which will be installing the TDM equipment at central offices.

Anchor Tenant Access

✓ Anchor tenant access includes conduit to the outside plant fiber, building penetration, inside conduit, equipment racks and power for each of the anchor tenants. Cost is estimated from consultation with outside plant fiber installation vendors, inside plant vendors and Merit's own experience installing fiber into anchor tenants.

Miscellaneous

- ✓ Engineering consultant used to certify proposal for submission to ARRA. The cost included time and materials to review hardware and fiber route installations and timelines and is based upon vendor quote.
- ✓ System lineup and testing for the TDM equipment to be located at the central offices. This includes onsite engineers provisioning and acceptance testing of all of the TDM and network equipment to interface with the local ILEC and other CLECs located at the central office based upon vendor quote.
- ✓ Deployment charge is the travel expenses for the vendor engineers to install and test the TDM equipment located in the central offices and is based upon vendor quote..
- ✓ General installation and system testing for optical, router and switch equipment to be deployed at anchor tenants and central offices. Includes installation, testing, and provisioning of the equipment. Cost includes staffing and travel and is based upon vendor estimate.

2. Land, structure, rights-of-way, appraisals, etc.

• \$676,200

- The cost will go to pole and conduit make-ready fees, construction permits, and right of way permits.
- This amount is an estimate from the fiber construction company which also aligns with Merit's construction experience.
- All expenses are to be 20% supported by cash matching funds.



3. Relocation expenses and payment

Not Applicable

4. Architectural and engineering fees

• \$4,703,356

- These budget costs are for fiber route surveying and engineering, documentation including as-built drawings, engineering/project management of fiber build projects. Also included in the cost are engineering and documentation for entrance into anchor tenants and central offices.
- This amount is an estimate from the fiber construction company and Merit's experience managing fiber construction projects. Merit's partner has also included a portion of an engineering position based upon current salaries within their corporation.
- Pre–award engineering costs are also included. \$3,500 was charged by the professional engineer to validate the engineering plans, Engineering Certification Q31, for the project and costs are from invoices.
- All expenses are to be 20% supported by cash matching funds.

5. Other architectural and engineering fees

• \$33,823

- The cost for the initial consultation with a design engineering firm is included at approximately \$150/hour (current rates) with an estimate of 225 hours in the first six months.
- All expenses are to be 20% supported by cash matching funds.

6. Project inspection fees

- \$1,690,498
- Fees are for pole and right of way owner inspection of proposed routes and verification of acceptance once work is completed.
- Expense estimates are from the fiber construction company and Merit's experience in fiber construction projects.
- All expenses are to be 20% supported by cash matching funds

7. Site work

• \$1,696,898

- This includes inside plant preparation work including conduit, fiber panel, and power installation for network and optical equipment. Also in this budget category are the added costs of working with local telecommunication companies to penetrate the indentified central offices in the proposal. This category also includes costs for power improvement by the partner.
- The cost is based upon estimates from a fiber construction company and is aligned with Merit's experience in preparing a facility for network and optical equipment. Power improvement costs based upon vendor quote.
- All expenses are to be 20% supported by cash matching funds.



8. Demolition and removal

Not Applicable

9. Construction

- \$25,357,463
- This category includes installation of fiber on utility poles for approximately 80% of the 955 fiber miles, directional boring and conduit installation for underground fiber installation along approximately 20% of the project route. Construction materials, fiber, hang tags, messenger cable, poles, conduit, hand holes, and other materials related to fiber installation, and work crews to install the fiber are part of this category.
- These costs are from estimates from the fiber construction company and align with Merit's experience with fiber installation on utility poles and underground work.
- All expenses are to be 20% supported by cash matching funds.

10. Equipment

- \$5,485,955
- Optical and network equipment to be installed for service delivery.
- The cost is from equipment quotes from optical transport, telecom and network equipment vendors.
- Below is a comprehensive listing of all of the equipment along with the quotes from the vendors:

			er 10Gbps Layer 3 Switches to Be Deployed At All DWDM OADM Sites*		
Site	Qty	Model	Description	Price	Extended
Muskegon	1	EX4200-24F	EX 4200, 24-port 1000BaseX SFP + 320W AC PS, Includes 50cm VC cable	8,800	8,800
	1	EX-PWR-320-AC	EX 4200 and EX 3200 320W AC Power Supply (power cord needs to be ordered separate	275	275
	1	CBL-EX-PWR-C13-US	Power Cable, US	28	28
	1	EX-UM-2XFP	EX 4200 and EX 3200 2-Port 10G XFP Uplink Module	1,100	1,100
	1	EX-24-AFL	Advanced Feature License for EX 3200-24T/P and EX 4200-24T/P/F SKUs	1,600	1,600
	2	EX-SFP-1GE-LX40K	SFP 1000BASE-LX; LC connector; 1310nm; 40km reach on single-mode fiber	100	200
	2	XFP-10Gbsp	XFP 10GBASE-ZR; LC connector; 1550nm;	759	1,517
Traverse C	1	EX4200-24F	EX 4200, 24-port 1000BaseX SFP + 320W AC PS, Includes 50cm VC cable	8,800	8,800
	1	EX-PWR-320-AC	EX 4200 and EX 3200 320W AC Power Supply (power cord needs to be ordered separate	275	275
	1	CBL-EX-PWR-C13-US	Power Cable, US	28	28
	1	EX-UM-2XFP	EX 4200 and EX 3200 2-Port 10G XFP Uplink Module	1,100	1,100
	1	EX-24-AFL	Advanced Feature License for EX 3200-24T/P and EX 4200-24T/P/F SKUs	1,600	1,600
	2	EX-SFP-1GE-LX40K	SFP 1000BASE-LX; LC connector; 1310nm; 40km reach on single-mode fiber	100	200
	2	XFP-10Gbsp	XFP 10GBASE-ZR; LC connector; 1550nm;	759	1,517
Mackinaw	1	EX4200-24F	EX 4200, 24-port 1000BaseX SFP + 320W AC PS, Includes 50cm VC cable	8,800	8,800
	1	EX-PWR-320-AC	EX 4200 and EX 3200 320W AC Power Supply (power cord needs to be ordered separate	275	275
	1	CBL-EX-PWR-C13-US	Power Cable, US	28	28
	1	EX-UM-2XFP	EX 4200 and EX 3200 2-Port 10G XFP Uplink Module	1,100	1,100
	1	EX-24-AFL	Advanced Feature License for EX 3200-24T/P and EX 4200-24T/P/F SKUs	1,600	1,600
	2	EX-SFP-1GE-LX40K	SFP 1000BASE-LX; LC connector; 13 10nm; 40km reach on single-mode fiber	100	200
	2	XFP-10Gbsp	XFP 10GBASE-ZR; LC connector; 1550 nm;	759	1,517

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T			24 Port 10/100/1000 10 Gbps Uplinl	s Total	148,718
	4	XFP-10Gbsp	XFP 10GBASE-ZR; LC connector; 1550nm;	758	3,032
	4	EX-SFP-1GE-LX40K	SFP 1000BASE-LX; LC connector; 1310nm; 40km reach on single-mode fiber	100	400
	2	EX-24-AFL	Advanced Feature License for EX 3200-24T/P and EX 4200-24T/P/F SKUs	1,600	3,200
	2	EX-UM-2XFP	EX 4200 and EX 3200 2-Port 10G XFP Uplink Module	1,100	2,200
	2	CBL-EX-PWR-C13-US	Power Cable, US	28	56
	2	EX-PWR-320-AC	EX 4200 and EX 3200 320W AC Power Supply (power cord needs to be ordered separate	275	550
Spares	2	EX4200-24F	EX 4200, 24-port 1000BaseX SFP + 320W AC PS, Includes 50cm VC cable	8,800	17,600
	2	XFP-10Gbsp	XFP 10GBASE-ZR; LC connector; 1550nm;	758	1,517
	2	EX-SFP-1GE-LX40K	SFP 1000BASE-LX; LC connector; 1310nm; 40km reach on single-mode fiber	100	200
	1	EX-24-AFL	Advanced Feature License for EX 3200-24T/P and EX 4200-24T/P/F SKUs	1,600	1,600
	1	EX-UM-2XFP	EX 4200 and EX 3200 2-Port 10G XFP Uplink Module	1,100	1,100
	1	CBL-EX-PWR-C13-US	Power Cable, US	28	28
	1	EX-PWR-320-AC	EX 4200 and EX 3200 320W AC Power Supply (power cord needs to be ordered separate	275	275
Benton Ha	1	EX4200-24F	EX 4200, 24-port 1000BaseX SFP + 320W AC PS, Includes 50cm VC cable	8,800	8,800
	2	XFP-10Gbsp	XFP 10GBASE-ZR; LC connector; 1550nm;	758	1,517
	2	EX-SFP-1GE-LX40K	SFP 1000BASE-LX; LC connector; 1310nm; 40km reach on single-mode fiber	100	200
	1	EX-24-AFL	Advanced Feature License for EX 3200-24T/P and EX 4200-24T/P/F SKUs	1,600	1,600
	1	EX-UM-2XFP	EX 4200 and EX 3200 2-Port 10G XFP Uplink Module	1,100	1,100
	1	CBL-EX-PWR-C13-US	Power Cable, US	28	28
	1	EX-PWR-320-AC	EX 4200 and EX 3200 320W AC Power Supply (power cord needs to be ordered separate	275	275
Hillsdale	1	EX4200-24F	EX 4200, 24-port 1000BaseX SFP + 320W AC PS, Includes 50cm VC cable	8,800	8,800
	2	XFP-10Gbsp	XFP 10GBASE-ZR; LC connector; 1550nm;	758	1,517
	2	EX-SFP-1GE-LX40K	SFP 1000BASE-LX; LC connector; 1310nm; 40km reach on single-mode fiber	100	200
	1	EX-24-AFL	Advanced Feature License for EX 3200-24T/P and EX 4200-24T/P/F SKUs	1,600	1,600
	1	EX-UM-2XFP	EX 4200 and EX 3200 2-Port 10G XFP Uplink Module	1,100	1,100
	1	CBL-EX-PWR-C13-US	Power Cable, US	28	28
	1	EX-PWR-320-AC	EX 4200 and EX 3200 320W AC Power Supply (power cord needs to be ordered separate	275	275
Monroe	1	EX4200-24F	EX 4200, 24-port 1000BaseX SFP + 320W AC PS, Includes 50cm VC cable	8,800	8,800
	2	XFP-10Gbsp	XFP 10GBASE-ZR; LC connector; 1550 nm;	758	1,517
	2	EX-SFP-1GE-LX40K	SFP 1000BASE-LX; LC connector; 1310nm; 40km reach on single-mode fiber	100	200
	1	EX-24-AFL	Advanced Feature License for EX 3200-24T/P and EX 4200-24T/P/F SKUs	1,600	1,600
	1	EX-UM-2XFP	EX 4200 and EX 3200 2-Port 10G XFP Uplink Module	1,100	1,100
	1	CBL-EX-PWR-C13-US	Power Cable, US	28	28
	1	EX-PWR-320-AC	EX 4200 and EX 3200 320W AC Power Supply (power cord needs to be ordered separate	275	275
Midland	1	EX4200-24F	EX 4200, 24-port 1000BaseX SFP + 320W AC PS, Includes 50cm VC cable	8,800	8,800
		XFP-10Gbsp	XFP 10GBASE-ZR; LC connector; 1550nm;	758	1,517
	-	EX-SFP-1GE-LX40K	SFP 1000BASE-LX; LC connector; 13 10 nm; 40 km reach on single-mode fiber	100	200
	-	EX-24-AFL	Advanced Feature License for EX 3200-24T/P and EX 4200-24T/P/F SKUs	1,600	1,600
	-	EX-UM-2XFP	EX 4200 and EX 3200 2-Port 10G XFP Uplink Module	1,100	1,100
	-	CBL-EX-PWR-C13-US		273	273
niiinan		EX-PWR-320-AC	EX 4200 and EX 3200 320W AC Power Supply (power cord needs to be ordered separate	275	275
Hillman		EX4200-24F	EX 4200, 24-port 1000BaseX SFP + 320W AC PS, Includes 50cm VC cable	8,800	1,517 8,800
	-	XFP-10Gbsp	XFP 10GBASE-ZR; LC connector; 1550nm;	100 759	200
	-	EX-SFP-1GE-LX40K	SFP 1000BASE-LX; LC connector; 1310nm; 40km reach on single-mode fiber	1,600	
	_	EX-UM-2XFP EX-24-AFL	EX 4200 and EX 3200 2-Port 10G XFP Uplink M odule Advanced Feature License for EX 3200-24T/P and EX 4200-24T/P/F SKUs	1,100	1,100 1,600
	-	CBL-EX-PWR-C13-US	· · · · ·	28	28
		EX-PWR-320-AC	EX 4200 and EX 3200 320W AC Power Supply (power cord needs to be ordered separate	275	275
	4		EX 4200, 24-port 1000BaseX SFP + 320W AC PS, Includes 50cm VC cable	8,800	275



			Juniper Metro 10Gbps Ethernet Router		
Site	Qty	Model	Description	Price	Extended
Mackinaw	1	MX480-PREMIUM-AC	Base system with redundant RE-2000,SCB,and power	107,000	107,000
	1	JUNOS-WW	JUNOS Worldwide Version	10,000	10,000
	4	CBL-M-PWR-RA-US	M 120/M 320/M X960 AC Power Cord,USA/Canada (N6/20),C19,20A/250V,2.5m,Right Angle	75	300
	1	JS-IPv6	IPv6 Support on JUNOS	10,000	10,000
	1	DPCE-R-4XGE-XFP	4x10GE Enahnced DPC for MX, requires optics sold separately	96,000	96,000
	3	XFP-10G-L-OC192-SR	Dual Rate 10G pluggable transceiver for 10GE and OC 192, 1310nm for 10Km transmission.	4,800	14,400
	1		J-Care NextDay Support for MX480 Chassis (includes RE/SCB/PWR/JUNOS)	4,140	4,140
Mt. Pleasa	1		Base system with redundant RE-2000,SCB,and power	107,000	107,000
	1	JUNOS-WW	JUNOS Worldwide Version	10,000	10,000
	4	CBL-M-PWR-RA-US	M 120/M 320/M X960 AC Power Cord,USA/Canada (N6/20),C19,20A/250V,2.5m,Right Angle	75	300
	1	JS-IPv6	IPv6 Support on JUNOS	10,000	10,000
	1	DPCE-R-4XGE-XFP	4x10GE Enahnced DPC for MX, requires optics sold separately	96,000	96,000
	3	XFP-10G-L-OC192-SR	Dual Rate 10G pluggable transceiver for 10GE and OC 192, 13 10nm for 10Km transmission.	4,800	14,400
	1	SVC-ND-MX480	J-Care NextDay Support for MX480 Chassis (includes RE/SCB/PWR/JUNOS)	4,140	4,140
			Metro 10Gbps Ethernet Ro	uter Total	483,680
			Core Router with OC3 Interfaces		
Site	Qty	Model	Description	Price	Extended
TBD	1	Cisco 7206	Cisco 7206 Router with OC3 Card G2	68,155	68,155
			Core Router with OC3 Interf	aces Total	68,155
		c	isco 1Gbps Layer 3 Switches to Be Deployed At All DWDM ILA Sites		
Site	Qty	Model	Description	Price*	
Zeeland	1	WS-C3750G-12S-E	Cisco 3750 12 Port 10/100/1000 Switch	7,254	7,254
Manistee	1	WS-C3750G-12S-E	Cisco 3750 12 Port 10/100/1000 Switch	7,254	7,254
Petoskey	1	WS-C3750G-12S-E	Cisco 3750 12 Port 10/100/1000 Switch	7,254	7,254
, Gaylord	1	WS-C3750G-12S-E	Cisco 3750 12 Port 10/100/1000 Switch	7,254	7,254
Grayling	1	WS-C3750G-12S-E	Cisco 3750 12 Port 10/100/1000 Switch	7,254	7,254
Gladwin	_	WS-C3750G-12S-E	Cisco 3750 12 Port 10/100/1000 Switch	7,254	7,254
Bay City		WS-C3750G-12S-E	Cisco 3750 12 Port 10/100/1000 Switch	7,254	7,254
	_	WS-C3750G-12S-E	Cisco 3750 12 Port 10/100/1000 Switch	7,254	7,254
Pinconnin				7,234	
	1	WS-C3750G-12S-E	Cisco 3750 12 Port 10/100/1000 Switch	7 254	
Oscoda		WS-C3750G-12S-E	Cisco 3750 12 Port 10/100/1000 Switch	7,254	
Oscoda Adrian	1	WS-C3750G-12S-E WS-C3750G-12S-E WS-C3750G-12S-E	Cisco 3750 12 Port 10/100/1000 Switch Cisco 3750 12 Port 10/100/1000 Switch Cisco 3750 12 Port 10/100/1000 Switch	7,254 7,254 7,254	7,254
Pinconnin Oscoda Adrian Spare	1	WS-C3750G-12S-E	Cisco 3750 12 Port 10/100/1000 Switch	7,254 7,254	7,254 7,254 14,508 87,048
Oscoda Adrian Spare	1	WS-C3750G-12S-E WS-C3750G-12S-E	Cisco 3750 12 Port 10/100/1000 Switch Cisco 3750 12 Port 10/100/1000 Switch	7,254 7,254	7,254 14,508
Oscoda Adrian Spare	1	WS-C3750G-12S-E WS-C3750G-12S-E	Cisco 3750 12 Port 10/100/1000 Switch Cisco 3750 12 Port 10/100/1000 Switch 12 Port 10/100/1000 Sw	7,254 7,254	7,254
Oscoda Adrian Spare	1	WS-C3750G-12S-E WS-C3750G-12S-E tes are based on pr	Cisco 3750 12 Port 10/100/1000 Switch Cisco 3750 12 Port 10/100/1000 Switch 12 Port 10/100/1000 Sw evious quotes received by Merit Western Cooridor DWDM System Description	7,254 7,254	7,254 14,508
Oscoda Adrian Spare * Cost est	1 2 imat	WS-C3750G-12S-E WS-C3750G-12S-E es are based on pr Model	Cisco 3750 12 Port 10/100/1000 Switch Cisco 3750 12 Port 10/100/1000 Switch 12 Port 10/100/1000 Sw evious quotes received by Merit Western Cooridor DWDM System Description FSP 3000R7 Commons and Shelves	7,254 7,254 ritch Total Price	7,254 14,508 87,048 Extended
Oscoda Adrian Spare * Cost est	1 2 imat Qty 11	WS-C3750G-12S-E WS-C3750G-12S-E tes are based on pr Model 78700001	Cisco 3750 12 Port 10/100/1000 Switch Cisco 3750 12 Port 10/100/1000 Switch 12 Port 10/100/1000 Sw evious quotes received by Merit Western Cooridor DWDM System Description	7,254 7,254 /itch Total Price 2,377	7,254 14,508 87,048 Extended 26,152
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Oscoda Adrian Spare * Cost est	1 2 mat 11 11 11 21 21 90	WS-C3750G-12S-E WS-C3750G-12S-E tes are based on pr Model 78700001 0063708410 1063708463 006 1705993 1063708481	Cisco 3750 12 Port 10/100/1000 Switch Cisco 3750 12 Port 10/100/1000 Switch 12 Port 10/100/1000 Sw evious quotes received by Merit Western Cooridor DWDM System Description FSP 3000R7 Commons and Shelves 7HU Shelf with Shelf Control Unit and redundant DC PSUs included Network Element Control Unit (NCU2E), 2.5 HU high, 2 RJ45 Ethernet ports, additional RTU license required Optical Supervisory Channel M odule with 2 pluggable network ports SFP client I/F for 1510nm, ultra long reach, 125M bit/s only, for use with OSCM-PN and OSFM +# 1510 Optical Supervisory Channel Filter M odule, 1510 nm	7,254 7,257 7,254 7,257	7,254 14,508 87,048 Extended 26,152 7,153 8,606 21,123 14,295



9 0683708200 VIC Corr XPOR with XPP client []: LR GSNR spiritural C-Bard Tunble DWDM Network 10,150 91,34/ 9 0683708200 Figs 30087 Pluggals Optics				FSP 3000R7 WDM Channel Modules - Core Type		
B 0 0043702200 FF 300877 Pluggable Optics 10,150 91,443 9 0051701811 105 XPP I for 30mm, standard meth, 8035 Obtics 1400 Obtivs 752 6,76 1 063708320 th XPP I for 30mm, standard meth, 8035 Obtics 1400 Obtivs 17,922 17,922 17,922 5 063708320 th Module, 2-Depree, MPSS-Based, 40 C-Band Wavelengths, 100 Obt, with WSS, 100 Obt S, 100 Not						
9 006 070 811 ING XFP VF for 150m, standard reach, 9.83 Gardy -1.400 GbV3 752 6,765 1 063708320 KR ADM Motids, 6-Degree, WSS-Baser, 40.0-Bard Wavelengths, 00 Gitz, with WSS, 12 Pues Splitter, and lengrated OPM, RADAM -CAU/OPM 17,922 17,922 17,922 5 063708320 WS Baser, 40.0-Bard Wavelengths, 00 Gitz, with WSS, 12 Pues Splitter, and lengrated OPM, RADAM -CAU/OPM 396 2,37 6 093708440 Passive Splitter, and lengrated OPM, RADAM -CAU/OPM 396 2,37 6 093708440 Passive Splitter, and lengrated OPM, RADAM -CAU/OPM 396 2,37 6 093708404 Passive Splitter, and lengrated OPM, RADAM -CAU/OPM 396 2,37 7 00010 Argent application, Single Stage 20048 meanum output prove, 4,562 27,37 300 300 301,31,87 7 003708051 Optical Anciller for Booter application, Single Stage 20048 meanum output prove, 4,562 25,55 55 55 7 003800000 DC Power Cale length 300 m, 31 Wave, High Power 25 555 7 003800000 0ptical Attenuator & Adaptors 752 004,73		9	0063700200		10,150	91,349
C FP 3097 Optical Filters Filters Filters 1 063708320 RODM Modine, Jourge WSB Meeregates CPM, BROADM-C40/07PM, WKSB, the Power Splitter, and Integrated CPM, RROADM-C40/07PM, WKS, the Power Splitter, and Integrated CPM, ROADM-C40/07PM, WKS, the Power Splitter, and Integrated CPM, Power Spli				FSP 3000R7 Pluggable Optics		
1 983708320 ROADM Module, 8-Dagree, WSS-Based, 3C - Cand Wavelengths, 20 GHz, with WSB, 52 17,922 17,922 5 98370830 WSS, bar News Splitter, and Integrated OVM, RACAM-CAUO/OM 396 2,37 6 98370840 Passive Shart Control Unit 396 2,37 6 108370840 Passive Shart Control Unit 396 2,37 6 108370840 Passive Shart Control Unit 396 2,37 6 108370840 Passive Shart Control Unit 396 2,37 6 1083708000 Obtical Amplifier for Booster application, Single Stage 20dBm meaninamoutput power, valiable gan, gain controlled (C-Band) with Duit Mountoing Pars, EDPA-C-320-COE-DM 4,562 27,37 7 0183708005 Obtical Amplifier for Booster application, Single Stage 20dBm meaninamoutput power, valiable gan, gain controlled (C-Band) with Duit Mountoing Pars, EDPA-C-320-COE-DM 6,594 131,87 14 0089000584 FSP 3000R7 Dispersion Compensation 7,158 100.020 14 1083700000 Deriver Cable Institution Trav Wave Resound Stope FTB, stand-store 7,158 100.020 14 008900059 Jumeer for internei		9	0061701811	11G XFP I/F for 1310nm, standard reach, 9.953 Gbit/s-11.400 Gbit/s	752	6,767
1 063.0063.00 ba Power Splitter, and inergrated CPM, BROADM-C40/07/074 17,922 17,922 5 063.708.00 MCADMA dotab. C-Organe, MSS-Basel, B.OBad WaverEight, B.O.E. Off. 2005FL, with WSS, bc. Power Splitter, and inergrated CPM, NADAM-C80/07/OPM 11,166 55,821 6 063.708.400 PBSCU Interface Cable (EEEED54 type) 24 144 6 073.708.700 40 - Channel XMW Warbens, XD GOTAB Splatface 2FU shaft 7,610 45,552 7 083.708.500 Optical Amplifter To Boots angulation, Single Stage-2GDB maximum output power, and correlate (C-Band) with bulk Monitoring Peris, EDFA.C-Stav.C-GB.W.M. 45,562 27,37. 7 083.708.051 Optical Amplifter To Boots angulations Companiation optical monitoring the single-done 45,552 27.37. 7 083.708.051 Optical Amplifter To Boots angulations Companiation optical monitoring the single-done 6,594 131,87. 7 083.708.061 FFP 30.008.7 Disperison Companiation Companiation Companiation Companiation Companiation Companiation Companiation Companiation Companiation Companies and Sub-site 7.158 100.020 22 03670.0001 Optical Attenuator sequencind 46 1,000 1.000 1.000 1.000				-		
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6 036000570 PSCU Interface Cable (IEEE194 type) 2.24 1.44 6 036000570 40-Chamol AVG MuxDomax, to Gitz, C-Bard, Separate 2HJ ahell 7,610 45,651 6 03700050 Optical Amplifier for BooRT Optical Amplifiers 60-00000000000000000000000000000000000		-			•	
6 078708790 40-Charmel AWG Mus/Demax, '00 GHz, C-Bard, Separate 2HJ shell 7,610 45,651 6 1083709050 Optical Amplifier for Boost explosition, 'Bigli Sagaz 20 GHm maximum output power,						
C FSP 30087 Optical Amplifiers File File 6 th63709050 Optical Amplifier Date Straig 2005 maximum output power, end to power, optical Amplifier, Date Straig 2005 maximum output power, end to power, optical Amplifier, Date Straig 2005 maximum output power, end to power, optical Amplifier, Date Straig 2005 maximum output power, end to power, optical Amplifier, Date Straig 2005 maximum output power, end to power, optical Amplifier, Date Straig 2005 maximum output power, end to power, optical Amplifier, Date Straig 2005 maximum output power, end to power, optical Amplifier, Date Straig 2005 maximum output power, end to power, optical Amplifier, Date Straig 2005 maximum output power, end to power, optical Attenuators & Adaptors 7,158 100,200 22 038700004 DC Power Cable length 300 cm 3 Wires, High Power 2,5 555 22 038700000 Jurger for internal cabling - connector, length and modenot specified 46 20,3,44 4## 005000000 Jurger for internal cabling - connector, length and modenot specified 46 20,3,44 6 0078700001 7HJ Sheff With Sheff Control Unit and redundate DC PSUs included 2,377 14,2,66 6 0078700001 7HJ Sheff With Sheff Control Unit and redundate DC PSUs included 2,377 14,2,66 6 007870001 7HJ Sheff With Sheff Control Unit and redundate DC PSUs included						146
6 1063700000 Optical Amplifier for Boatser application, Single Stage 20.0Bm maximum output power, variable grin gain gain controlled (C-Band) with Dual Montoring Ports, EDFA-C-520-COB-DM 4,562 27,37 20 1063708051 Optical Amplifier, Double Stage 20.0Bm maximum output power, variable grin gain controlled (C-Band) with Dual Montoring Ports, EDFA-C-520-COB-DM 6,594 1131,87 14 008900584 Ummarged Dispersion Compression Compensation 7,158 1000,200 21 036700004 DC Power Cable length 300 cm, 3 Wites, Hgh Power 225 555 22 0088300000 Optical Attenuator s & Adaptors 46 1,000 31 mit optical Cables		6	1078708790		7,610	45,659
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14 008900084 Ummaraged Dispersion Compression for True Wave Reduced Slope Fiber, stand-alone Hut Jerld, BOKm 7,158 100,200 22 0036700004 DC Power Cable length 300 cm, 3 Wires, Hgh Power 25 559 22 0053300000 Optical Attenuators & Adaptors 25 23 0058000000 Optical Attenuator unspecified 46 1,000 44 005800000 Jumper for internal cabling - connector, length and mode not specified 46 20,344 50 007700001 Jumper for internal cabling - connector, length and mode not specified 46 20,344 Central Cooridor DWDM System Site Qty Model FSP 3000R7 Commons and Shelves F 6 0078700001 74U Shelf with Shelf Corritol Unit (NCU2E), 2.5H High, 2.RU45 Ethernet ports, additional 650 3.900 6 0083708449 Rtwork Etheret Control Unit (NCU2E), 2.5H Jugh, 2.RU45 Ethernet ports, additional 650 3.900 6 0083708449 Rtwork Etheret Control Unit (NCU2E), 2.5H Jugh, 2.RU45 Ethernet ports, additional 650 3.900 10 0087708441 Pricet & FSP 3000R7 Software and Licenses 782 4,659 10 0087708411 Dummy card SHU 782 3.823 <td></td> <td>20</td> <td>1063709051</td> <td></td> <td>6,594</td> <td>131,877</td>		20	1063709051		6,594	131,877
14 Ubushul Usski FJP 3000R7 Electrical Cables 7,158 100,200 22 1036700004 DC Power Cable length 300 cm, 3 Wires, Hgh Power 25 555 22 1036700004 DC Power Cable length 300 cm, 3 Wires, Hgh Power 25 555 24 0058300000 Optical Attenuators & Adaptors 46 1,000 411 005500000 Jumper for internal cabling - connector, length and mode not specified 46 20,341 411 005500000 Jumper for internal cabling - connector, length and mode not specified 46 20,341 5ite Qty Model Central Cooridor DWDM System 71,14,261 5ite Qty Model FSP 3000R7 Commons and Shelves 71,14,261 6 007870001 7HJ Sheff with Sheff Control Unit and redundant DC PSUs included 2,377 14,4261 6 0063708443 Optical Supervisory Channel Module with 2 pluggble network ports 782 4,659 71 006705993 SFP client FJ For Shum, Utalong reach, 254 bit/s only, for use with 0550-FN and 0,066 100,055 10 0063709401 Dummy ca				FSP 3000R7 Dispersion Compensation		
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22 0958300000 Optical Attenuator unspecified 46 1,000 ## 005000000 Jumper for internal cabling - connector, length and mode not specified 46 20,343 ## 005000000 Jumper for internal cabling - connector, length and mode not specified 46 20,343 Site Qty Model Central Cooridor DWDM System Frice Extended Site Qty Model Description Price Extended 6 0078700001 7HJ Sheff with Shell Control Unit (NCU2E), 2.5HJ light, 2.RJ45 Ethernet ports, additional 650 3,900 6 0063708410 Network Element Control Unit (NCU2E), 2.5HJ light, 2.RJ45 Ethernet ports, additional 650 3,900 10 066709843 Optical Supervisory Channel Module with 2 pluggable network ports 782 4,693 10 066709803 OSFILENT IF for 150 mm, uitra long reach, 125M bit/s only, for use with OSCM-PN and 1,006 10,055 10 1063708481 Optical Supervisory Channel Filter M odue, 150 m 681 6,800 10 1063708020 Dummy card SHU FSP 3000R7 Software and Licenses<		22	1036700004	DC Power Cable length 300 cm, 3 Wires, High Power	25	559
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Image Central Cooridor DWDM System Site Oty Model Central Cooridor DWDM System Site Oty Model FSP 3000R7 Commons and Shelves Price Extended 6 0078700001 7HU Sheff with Sheff Control Unit and redundant DC PSUs included 2,377 14,263 6 0063708410 Network Element Control Unit and redundant DC PSUs included 2,377 14,264 10 0061705993 SFP client UF for 150m, ultralong reach, 125M bit/s only, for use with OSCM-PN and 1,006 100,053 10 0063708481 Optical Supervisory Channel Filter M odule, 150 nm 681 6,800 54 0091700040 Right to use CWDM and DWDM using Access and Core cards 1,372 8,230 6 0091700040 Right to use GMPLS Control plane functionality 2,530 15,172 5 006370810 If GX FP UF for 1310m, standard reach, 9,953 Gbit/s-11400 Gbit/s 752 3,752 5 0063700200 Right to use GMPLS Control plane functionality 2,530 17,922 6 091700040 Right no use GMPLS Control plane functionality 10,				Optical Cables		
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S 0063700200 IF, WCC-PCTN-10G-LN# DC 10,150 50,743 Image: S 0061701811 IfF, WCC-PCTN-10G-LN# DC 10,150 50,743 S 0061701811 11G XFP I/F for 1310nm, standard reach, 9.953 Gbit/s-11.400 Gbit/s 752 3,759 Image: S 0063708320 ROADM Module, 8-Degree, WSS-Based, 40 C-Band Wavelengths, 100 GHz, with WSS, 17,922 17,922 17,922 1 1063708320 ROADM Module, 2-Degree, WSS-Based, 40 C-Band Wavelengths, 50 GHz/100GHz, with WSS, 12 Power Splitter, and Integrated OPM, 8ROADM-C40/0/OPM 11,166 111,166 1 1063708310 ROADM Module, 2-Degree, WSS-Based, 80 C-Band Wavelengths, 50 GHz/100GHz, with WSS, 12 Power Splitter, and Integrated OPM, ROADM-C80/0/OPM 11,166 111,166 2 1063708440 Passive Shelf Control Unit 396 792 2 1036000570 PSCU Interface Cable (IEEE1394 type) 24 449 2 1078708790 40-Channel AWG Mux/Demux, 100 GHz, C-Band, Separate 2HU shelf 7,610 15,220 1 063709050 Optical Amplifier for Booster application, Single Stage 20dBm maximum output power, gain controlled (C-Band) with Dual Monitoring Ports, EDFA-C-S20-GCB-DM 4,562 9,		6 6 10 10 54 6	0063708410 1063708463 0061705993 1063708481 0063709901 0091700010	7HU Shelf with Shelf Control Unit and redundant DC PSUs included Network Element Control Unit (NCU2E), 2.5 HU high, 2 RJ45 Ethernet ports, additional RTU license required Optical Supervisory Channel M odule with 2 pluggable network ports SFP client I/F for 1510nm, ultra long reach, 125M bit/s only, for use with OSCM -PN and OSFM +# 1510 Optical Supervisory Channel Filter M odule, 1510 nm Dummy card 5HU FSP 3000R7 Software and Licenses Right to use CWDM and DWDM using Access and Core cards	650 782 1,006 681 24 1,372	3,901 4,694 10,058 6,807 1,317 8,230
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5 0061701811 11G XFP I/F for 1310nm, standard reach, 9.953 Gbit/s-11.400 Gbit/s 752 3,759 1 063708320 ROADM Module, 8-Degree, WSS-Based, 40 C-Band Wavelengths, 100 GHz, with WSS, 17,922 17,922 17,922 1 1063708320 ROADM Module, 2-Degree, WSS-Based, 40 C-Band Wavelengths, 100 GHz, with WSS, 17,922 17,922 17,922 1 1063708310 ROADM Module, 2-Degree, WSS-Based, 80 C-Band Wavelengths, 50 GHz/100GHz, with WSS, 12 Power Splitter, and Integrated OPM, ROADM-C80/0/OPM 11,166 11,166 2 1063708440 Passive Shelf Control Unit 396 792 2 1036000570 PSCU Interface Cable (IEEE1394 type) 24 449 2 1078708790 40-Channel AWG Mux/Demux, 100 GHz, C-Band, Separate 2HU shelf 7,610 15,220 C 1063709050 Optical Amplifier for Booster application, Single Stage 20dBm maximum output power, gain controlled (C-Band) with Dual Monitoring Ports, EDFA-C-S20-GCB-DM 4,562 9,124 10 1063709051 Optical Amplifier, Double Stage 20 dBm maximum output power, variable gain, gain 6,504 65,04		6 6 10 10 54 6	0063708410 1063708463 0061705993 1063708481 0063709901 0091700010 1091700040	7HU Shelf with Shelf Control Unit and redundant DC PSUs included Network Element Control Unit (NCU2E), 2.5 HU high, 2 RJ45 Ethernet ports, additional RTU license required Optical Supervisory Channel M odule with 2 pluggable network ports SFP client I/F for 1510nm, ultra long reach, 125M bit/s only, for use with OSCM-PN and CSFM +# 1510 Optical Supervisory Channel Filter M odule, 1510 nm Dummy card 5HU FSP 3000R7 Software and Licenses Right to use CWDM and DWDM using Access and Core cards Right to use GM PLS Control plane functionality FSP 3000R7 WDM Channel M odules - Core Type 10G Core XPDR with XFP client IF, LR OSNR optimized C-Band Tunable DWDM Network	650 782 1,006 681 24 1,372 2,530	3,901 4,694 10,058 6,807 1,317 8,230 15,179
1 1063708320 ROADM Module, 8-Degree, WSS-Based, 40 C-Band Wavelengths, 100 GHz, with WSS, 17,922 17,922 1 1063708320 ROADM Module, 8-Degree, WSS-Based, 40 C-Band Wavelengths, 100 GHz, with WSS, 17,922 17,922 1 1063708310 ROADM Module, 2-Degree, WSS-Based, 80 C-Band Wavelengths, 50 GHz/100GHz, with WSS, 12 Power Splitter, and Integrated OPM, ROADM-C80/0/OPM 11,166 11,166 2 1063708440 Passive Shelf Control Unit 396 792 2 1036000570 PSCU Interface Cable (IEEE1394 type) 24 44 2 1078708790 40-Channel AWG Mux/Demux, 100 GHz, C-Band, Separate 2HU shelf 7,610 15,220 FSP 3000R7 Optical Amplifiers 2 1063709050 Optical Amplifier for Booster application, Single Stage 20dBm maximum output power, gain controlled (C-Band) with Dual Monitoring Ports, EDFA-C-S20-GCB-DM 4,562 9,124 10 1063709051 Optical Amplifier, Double Stage 20 dBm maximum output power, variable gain, gain 6, ED 4 6, ED 4 6, ED 4		6 6 10 10 54 6	0063708410 1063708463 0061705993 1063708481 0063709901 0091700010 1091700040	7HU Shelf with Shelf Control Unit and redundant DC PSUs included Network Element Control Unit (NCU2E), 2.5 HU high, 2 RJ45 Ethernet ports, additional RTU license required Optical Supervisory Channel M odule with 2 pluggable network ports SFP client I/F for 1510nm, ultra long reach, 125M bit/s only, for use with OSCM-PN and OSFM +# 1510 Optical Supervisory Channel Filter M odule, 1510 nm Dummy card 5HU FSP 3000R7 Software and Licenses Right to use CWDM and DWDM using Access and Core cards Right to use GM PLS Control plane functionality FSP 3000R7 WDM Channel M odules - Core Type 10G Core XPDR with XFP client IF, LR OSNR optimized C-Band Tunable DWDM Network IF, WCC-PCTN-10G-LN# DC	650 782 1,006 681 24 1,372 2,530	3,901 4,694 10,058 6,807 1,317 8,230
11063708320ROADM Module, 8-Degree, WSS-Based, 40 C-Band Wavelengths, 100 GHz, with WSS, 1x8 Power Splitter, and Integrated OPM, 8ROADM-C40/0/OPM17,92217,92211063708310ROADM Module, 2-Degree, WSS-Based, 80 C-Band Wavelengths, 50 GHz/100GHz, with WSS, 1x2 Power Splitter, and Integrated OPM, ROADM-C80/0/OPM11,16611,16621063708440Passive Shelf Control Unit39679221036000570PSCU Interface Cable (IEEE1394 type)244492107870879040-Channel AWG Mux/Demux, 100 GHz, C-Band, Separate 2HU shelf7,61015,22021063709050Optical Amplifier for Booster application, Single Stage 20dBm maximum output power, gain controlled (C-Band) with Dual Monitoring Ports, EDFA-C-S20-GCB-DM4,5629,124101063709051Optical Amplifier, Double Stage 20 dBm maximum output power, variable gain, gain6, E0,46, E0,23		6 6 10 10 54 6 6 6 5 5	0063708410 1063708463 0061705993 1063708481 0063709901 0091700010 1091700040	7HU Shelf with Shelf Control Unit and redundant DC PSUs included Network Element Control Unit (NCU2E), 2.5 HU high, 2 RJ45 Ethernet ports, additional RTU license required Optical Supervisory Channel M odule with 2 pluggable network ports SFP client I/F for 1510nm, ultra long reach, 125M bit/s only, for use with OSCM -PN and OSFM +# 1510 Optical Supervisory Channel Filter M odule, 1510 nm Dummy card 5HU FSP 3000R7 Software and Licenses Right to use CWDM and DWDM using Access and Core cards Right to use GM PLS Control plane functionality FSP 3000R7 WDM Channel M odules - Core Type 10G Core XPDR with XFP client IF, LR OSNR optimized C-Band Tunable DWDM Network IF, WCC-PCTN-10G-LN# DC FSP 3000R7 Pluggable Optics	650 782 1,006 681 24 1,372 2,530 10,150	3,901 4,694 10,058 6,807 1,317 8,230 15,179 50,749
1 1063708320 1x8 Power Splitter, and Integrated OPM, 8ROADM-C40/0/OPM 17,922 17,922 1 1063708320 ROADM Module, 2-Degree, WSS-Based, 80 C-Band Wavelengths, 50 GHz/100GHz, with WSS, 1x2 Power Splitter, and Integrated OPM, ROADM-C80/0/OPM 11,166 11,166 2 1063708440 Passive Shelf Control Unit 396 792 2 1036000570 PSCU Interface Cable (IEEE1394 type) 24 44 2 1078708790 40-Channel AWG Mux/Demux, 100 GHz, C-Band, Separate 2HU shelf 7,610 15,220 FSP 3000R7 Optical Amplifiers 2 1063709050 Optical Amplifier for Booster application, Single Stage 20dBm maximum output power, gain controlled (C-Band) with Dual Monitoring Ports, EDFA-C-S20-GCB-DM 4,562 9,124 10 1063709051 Optical Amplifier, Double Stage 20 dBm maximum output power, variable gain, gain 6, E0,04 6, E0,04		6 6 10 10 54 6 6 6 5 5	0063708410 1063708463 0061705993 1063708481 0063709901 0091700010 1091700040	7HU Shelf with Shelf Control Unit and redundant DC PSUs included Network Element Control Unit (NCU2E), 2.5 HU high, 2 RJ45 Ethernet ports, additional RTU license required Optical Supervisory Channel M odule with 2 pluggable network ports SFP client I/F for 1510nm, ultra long reach, 125M bit/s only, for use with OSCM-PN and OSFM +# 1510 Optical Supervisory Channel Filter M odule, 1510 nm Dummy card 5HU FSP 3000R7 Software and Licenses Right to use CWDM and DWDM using Access and Core cards Right to use GM PLS Control plane functionality FSP 3000R7 WDM Channel M odules - Core Type 10G Core XPDR with XFP client IF, LR OSNR optimized C-Band Tunable DWDM Network IF, WCC-PCTN-10G-LN# DC FSP 3000R7 Pluggable Optics 11G XFP I/F for 1310nm, standard reach, 9.953 Gbit/s-11.400 Gbit/s	650 782 1,006 681 24 1,372 2,530 10,150	3,901 4,694 10,058 6,807 1,317 8,230 15,179
1 106370830 WSS, tx2 Power Splitter, and Integrated OPM, ROADM-C80/0/OPM 11,166 11,166 2 1063708440 Passive Shelf Control Unit 396 792 2 1036000570 PSCU Interface Cable (IEEE1394 type) 24 449 2 1078708790 40-Channel AWG M ux/Demux, 100 GHz, C-Band, Separate 2HU shelf 7,610 15,220 2 1078709050 Optical Amplifier for Booster application, Single Stage 20dBm maximum output power, gain controlled (C-Band) with Dual M onitoring Ports, EDFA-C-S20-GCB-DM 4,562 9,124 10 1063709051 Optical Amplifier, Double Stage 20 dBm maximum output power, variable gain, gain 6,504 65,041		6 6 10 10 54 6 6 6 5 5	0063708410 1063708463 0061705993 1063708481 0063709901 0091700010 1091700040	7HU Shelf with Shelf Control Unit and redundant DC PSUs included Network Element Control Unit (NCU2E), 2.5 HU high, 2 RJ45 Ethernet ports, additional RTU license required Optical Supervisory Channel Module with 2 pluggable network ports SFP client I/F for 1510nm, ultra long reach, 125M bit/s only, for use with OSCM -PN and OSFM +# 1510 Optical Supervisory Channel Filter Module, 1510 nm Dummy card SHU Image: State Colspan="2">State Colspan= Colspan="2">State Colspan="2">State Colsp	650 782 1,006 681 24 1,372 2,530 10,150	3,901 4,694 10,058 6,807 1,317 8,230 15,179 50,749
2 1063708440 Passive Shelf Control Unit 396 792 2 1036000570 PSCU Interface Cable (IEEE1394 type) 24 44 2 1078708790 40-Channel AWG M ux/Demux, 100 GHz, C-Band, Separate 2HU shelf 7,610 15,220 Image: Comparison of the state o		6 10 10 54 6 6 5 5 5	0063708410 1063708463 0061705993 1063708481 0063709901 0091700010 1091700040 0063700200	7HU Shelf with Shelf Control Unit and redundant DC PSUs included Network Element Control Unit (NCU2E), 2.5 HU high, 2 RJ45 Ethernet ports, additional RTU license required Optical Supervisory Channel M odule with 2 pluggable network ports SFP client I/F for 1510nm, ultra long reach, 125M bit/s only, for use with OSCM-PN and OSFM +# 1510 Optical Supervisory Channel Filter M odule, 1510 nm Dummy card 5HU FSP 3000R7 Software and Licenses Right to use GWDM and DWDM using Access and Core cards Right to use GM PLS Control plane functionality FSP 3000R7 WDM Channel M odules - Core Type 10G Core XPDR with XFP client IF, LR OSNR optimized C-Band Tunable DWDM Network IF, WCC-PCTN-10G-LN# DC FSP 3000R7 Pluggable Optics 11G XFP I/F for 13 10nm, standard reach, 9.953 Gbit/s-11.400 Gbit/s FSP 3000R7 Optical Filters ROADM Module, 8-Degree, WSS-Based , 40 C-Band Wavelengths, 100 GHz, with WSS,	650 782 1,006 681 24 1,372 2,530 10,150 752	3,901 4,694 10,058 6,807 1,317 8,230 15,179 50,749
2 1036000570 PSCU Interface Cable (IEEE1394 type) 24 44 2 1078708790 40-Channel AWG Mux/Demux, 100 GHz, C-Band, Separate 2HU shelf 7,610 15,220 2 10787090 40-Channel AWG Mux/Demux, 100 GHz, C-Band, Separate 2HU shelf 7,610 15,220 2 1063709050 Optical Amplifier for Booster application, Single Stage 20dBm maximum output power, gain controlled (C-Band) with Dual Monitoring Ports, EDFA-C-S20-GCB-DM 4,562 9,124 10 1063709051 Optical Amplifier, Double Stage 20 dBm maximum output power, variable gain, gain 6,504 6,504		6 10 10 54 6 6 6 5 5 5 1	0063708410 1063708463 0061705993 1063708481 0063709901 0091700010 1091700040 0063700200 0061701811	7HU Shelf with Shelf Control Unit and redundant DC PSUs included Network Element Control Unit (NCU2E), 2.5 HU high, 2 RJ45 Ethernet ports, additional RTU license required Optical Supervisory Channel M odule with 2 pluggable network ports SFP client I/F for 1510nm, ultra long reach, 125M bit/s only, for use with OSCM-PN and OSFM +# 1510 Optical Supervisory Channel Filter M odule, 1510 nm Dummy card 5HU FSP 3000R7 Software and Licenses Right to use CWDM and DWDM using Access and Core cards Right to use GM PLS Control plane functionality FSP 3000R7 WDM Channel Modules - Core Type 10G Core XPDR with XFP client IF, LR OSNR optimized C-Band Tunable DWDM Network IF, WCC-PCTN-10G-LN# DC FSP 3000R7 Pluggable Optics 11G XFP I/F for 1310nm, standard reach, 9.953 Gbit/s-11.400 Gbit/s FSP 3000R7 Optical Filters ROADM Module, 8-Degree, WSS-Based, 40 C-Band Wavelengths, 100 GHz, with WSS, 1x8 Power Splitter, and Integrated OPM, 8ROADM-C40/0/OPM	650 782 1,006 681 24 1,372 2,530 10,150 752 17,922	3,901 4,694 10,058 6,807 1,317 8,230 15,179 50,749 3,759 17,922
2 1078708790 40-Channel AWG Mux/Demux, 100 GHz, C-Band, Separate 2HU shelf 7,610 15,220 2 1063709050 FSP 3000R7 Optical Amplifiers 7 2 1063709050 Optical Amplifier for Booster application, Single Stage 20dBm maximum output power, gain controlled (C-Band) with Dual Monitoring Ports, EDFA-C-S20-GCB-DM 4,562 9,124 10 1063709051 Optical Amplifier, Double Stage 20 dBm maximum output power, variable gain, gain 6,504 65,041		6 6 10 10 54 6 6 6 6 5 5 5 1 1	0063708410 1063708463 0061705993 1063709901 0091700010 1091700040 0063700200 0061701811 1063708320 1063708310	7HU Shelf with Shelf Control Unit and redundant DC PSUs included Network Element Control Unit (NCU2E), 2.5 HU high, 2 RJ45 Ethernet ports, additional RTU license required Optical Supervisory Channel M odule with 2 pluggable network ports SFP client I/F for 1510nm, ultra long reach, 125M bit/s only, for use with OSCM -PN and OSFM +# 1510 Optical Supervisory Channel Filter M odule, 1510 nm Dummy card 5HU Experiment of the State of	650 782 1,006 681 24 1,372 2,530 10,150 752 17,922 11,166	3,901 4,694 10,058 6,807 1,317 8,230 15,179 50,749 3,759 17,922 11,166
2 1063709050 Optical Amplifier for Booster application, Single Stage 20dBm maximum output power, gain controlled (C-Band) with Dual Monitoring Ports, EDFA-C-S20-GCB-DM 4,562 9,124 10 1063709051 Optical Amplifier, Double Stage 20 dBm maximum output power, variable gain, gain 6,504 6,504		6 6 10 54 6 6 6 5 5 5 1 1 1 2	0063708410 1063708463 0061705993 1063709901 0091700010 1091700040 0063700200 0061701811 1063708320 1063708310 1063708440	7HU Shelf with Shelf Control Unit and redundant DC PSUs included Network Element Control Unit (NCU2E), 2.5 HU high, 2 RJ45 Ethernet ports, additional RTU license required Optical Supervisory Channel M odule with 2 pluggable network ports SFP client I/F for 1510nm, ultra long reach, 125M bit/s only, for use with OSCM-PN and OSFM +# 1510 Optical Supervisory Channel Filter M odule, 1510 nm Dummy card SHU ESP 3000R7 Software and Licenses Right to use CWDM and DWDM using Access and Core cards Right to use GM PLS Control plane functionality FSP 3000R7 WDM Channel M odules - Core Type 10G Core XPDR with XFP client IF, LR OSNR optimized C-Band Tunable DWDM Network IF, WCC-PCTN-10G-LN# DC FSP 3000R7 Pluggable Optics 11G XFP I/F for 1310nm, standard reach, 9.953 Gbit/s-11.400 Gbit/s FSP 3000R7 Optical Filters ROADM Module, 8-Degree, WSS-Based, 40 C-Band Wavelengths, 100 GHz, with WSS, 1x8 Power Splitter, and Integrated OPM, ROADM-C40/0/OPM ROADM Module, 2-Degree, WSS-Based, 80 C-Band Wavelengths, 50 GHz/100GHz, with WSS, 1x2 Power Splitter, and Integrated OPM, ROADM-C80/0/OPM Passive Shelf Control Unit	650 782 1,006 681 24 1,372 2,530 10,150 752 17,922 11,166 396	3,901 4,694 10,058 6,807 1,317 8,230 15,179 50,749 3,759 17,922 11,166 792
2 1063709050 Optical Amplifier for Booster application, Single Stage 20dBm maximum output power, gain controlled (C-Band) with Dual Monitoring Ports, EDFA-C-S20-GCB-DM 4,562 9,124 10 1063709051 Optical Amplifier, Double Stage 20 dBm maximum output power, variable gain, gain 6,504 6,504		6 6 10 10 54 6 6 6 7 5 5 7 1 1 2 2	0063708410 1063708463 0061705993 1063708481 0063709901 0091700010 1091700040 0063700200 0061701811 1063708320 1063708310 1063708310	7HU Shelf with Shelf Control Unit and redundant DC PSUs included Network Element Control Unit (NCU2E), 2.5 HU high, 2 RJ45 Ethernet ports, additional RTU license required Optical Supervisory Channel M odule with 2 pluggable network ports SFP client I/F for 1510nm, ultra long reach, 125M bit/s only, for use with OSCM-PN and OSFM +# 1510 Optical Supervisory Channel Filter M odule, 1510 nm Dummy card SHU Image: State S	650 782 1,006 681 24 1,372 2,530 10,150 752 17,922 11,166 396 24	3,901 4,694 10,058 6,807 1,317 8,230 15,179 50,749 3,759 17,922 11,166 792 49
2 1063709050 gain controlled (C-Band) with Dual Monitoring Ports, EDFA-C-S20-GCB-DM 4,562 9,124 10 1063709051 Optical Amplifier, Double Stage 20 dBm maximum output power, variable gain, gain 6,504 6,504		6 6 10 10 54 6 6 6 7 5 5 7 1 1 2 2	0063708410 1063708463 0061705993 1063708481 0063709901 0091700010 1091700040 0063700200 0061701811 1063708320 1063708310 1063708310	7HU Shelf with Shelf Control Unit and redundant DC PSUs included Network Element Control Unit (NCU2E), 2.5 HU high, 2 RJ45 Ethernet ports, additional RTU license required Optical Supervisory Channel M odule with 2 pluggable network ports SFP client I/F for 1510nm, ultra long reach, 125M bit/s only, for use with OSCM -PN and OSFM +# 1510 Optical Supervisory Channel Filter M odule, 1510 nm Dummy card SHU Experiment Control plane Filter M odule, 1510 nm Dummy card SHU Sight to use CWDM and DWDM using Access and Core cards Right to use GM PLS Control plane functionality FSP 3000R7 WDM Channel Modules - Core Type 10G Core XPDR with XFP client IF, LR OSNR optimized C-Band Tunable DWDM Network IF, WCC-PCTN-10G-LN# DC FSP 3000R7 Pluggable Optics 11G XFP I/F for 1310nm, standard reach, 9.953 Gbit/s-11.400 Gbit/s FSP 3000R7 Optical Filters ROADM Module, 8-Degree, WSS-Based, 80 C-Band Wavelengths, 100 GHz, with WSS, 1x8 Power Splitter, and Integrated OPM, ROADM -C40/0/OPM ROADM Module, 2-Degree, WSS-Based, 80 C-Band Wavelengths, 50 GHz/100GHz, with WSS, 1x2 Power Splitter, and Integrated OPM, ROADM -C80/0/OPM Passive Shelf Control Unit PSCU Interface Cable (IEEE1394 type) 40-Channel AWG M ux/Demux, 100 GHz, C-Band, Separate 2HU shelf	650 782 1,006 681 24 1,372 2,530 10,150 752 17,922 11,166 396 24	3,901 4,694 10,058 6,807 1,317 8,230 15,179 50,749 3,759 17,922 11,166 792 49
		6 6 10 10 54 6 6 6 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	0063708410 1063708463 0061705993 1063708481 0063709901 0091700010 1091700040 0063700200 0061701811 1063708320 1063708320 1063708440 1036000570 1078708790	7HU Shelf with Shelf Control Unit and redundant DC PSUs included Network Element Control Unit (NCU2E), 2.5 HU high, 2 RJ45 Ethernet ports, additional RTU license required Optical Supervisory Channel M odule with 2 pluggable network ports SFP client I/F for 1510nm, ultra long reach, 125M bit/s only, for use with OSCM-PN and OSFM +# 1510 Optical Supervisory Channel Filter M odule, 1510 nm Dummy card 5HU 8 Right to use CWDM and DWDM using Access and Core cards Right to use GM PLS Control plane functionality FSP 3000R7 WDM Channel Modules - Core Type 10G Core XPDR with XFP client IF, LR OSNR optimized C-Band Tunable DWDM Network IF, WCC-PCTN-10G-LN# DC FSP 3000R7 Pluggable Optics 11G XFP I/F for 1310nm, standard reach, 9.953 Gbit/s-11.400 Gbit/s ROADM Module, 8-Degree, WSS-Based, 40 C-Band Wavelengths, 100 GHz, with WSS, 1x8 Power Splitter, and Integrated OPM, ROADM -C40/0/OPM ROADM Module, 2-Degree, WSS-Based, 80 C-Band Wavelengths, 50 GHz/100GHz, with WSS, 1x2 Power Splitter, and Integrated OPM, ROADM -C80/0/OPM Passive Shelf Control Unit PSCU Interface Cable (IEEE1394 type) 40-Channel AWG M ux/Demux, 100 GHz, C-Band, Separate 2HU shelf FSP 3000R7 Optical Amplifiers	650 782 1,006 681 24 1,372 2,530 10,150 752 17,922 11,166 396 24 7,610	3,901 4,694 10,058 6,807 1,317 8,230 15,179 50,749 3,759 17,922 11,166 792 49 15,220
		6 6 10 10 54 6 6 6 6 7 5 5 7 7 7 7 2 2 2 2	0063708410 1063708463 0061705993 1063708481 0063709901 0091700010 1091700040 0063700200 0061701811 1063708320 1063708320 1063708310 1063708310 1063708709 1078708790	7HU Shelf with Shelf Control Unit and redundant DC PSUs included Network Element Control Unit (NCU2E), 2.5 HU high, 2 RJ45 Ethernet ports, additional RTU license required Optical Supervisory Channel M odule with 2 pluggable network ports SFP client I/F for 1510nm, ultra long reach, 125M bit/s only, for use with OSCM-PN and OSFM +# 1510 Optical Supervisory Channel Filter M odule, 1510 nm Dummy card 5HU FSP 3000R7 Software and Licenses Right to use GWDM and DWDM using Access and Core cards Right to use GM PLS Control plane functionality FSP 3000R7 WDM Channel M odules - Core Type 10G Core XPDR with XFP client IF, LR OSNR optimized C-Band Tunable DWDM Network IF, WCC-PCTN-10G-LN# DC FSP 3000R7 Pluggable Optics 11G XFP I/F for 13 10nm, standard reach, 9.953 Gbit/s-11.400 Gbit/s FSP 3000R7 Optical Filters ROADM Module, 8-Degree, WSS-Based , 40 C-Band Wavelengths, 100 GHz, with WSS, 1x8 Power Splitter, and Integrated OPM, 8ROADM-C40/0/OPM ROADM Module, 2-Degree, WSS-Based, 30 C-Band Wavelengths, 50 GHz/100GHz, with WSS, 1x2 Power Splitter, and Integrated OPM, 8ROADM-C40/0/OPM Passive Shelf Control Unit PSCU Interface Cable (IEEE1394 type) 40-Channel AWG M ux/Demux, 100 GHz, C-Band, Separate 2HU shelf FSP 3000R7 Optical Amplifiers Optical Amplifier for Booster a	650 782 1,006 681 24 1,372 2,530 10,150 752 17,922 11,166 396 24 7,610 4,562	3,901 4,694 10,058 6,807 1,317 8,230 15,179 50,749 3,759 17,922 11,166 792 49 15,220



			FSP 3000R7 Dispersion Compensation		
	2	0089000584	Unmanaged Dispersion Compensation for True Wave Reduced Slope Fiber, stand-alone 1HU shelf, 80km	7,158	14,315
	4	0089000585	Unmanaged Dispersion Compensation for True Wave Reduced Slope Fiber, stand-alone 1HU shelf, 100km	8,021	32,085
			FSP 3000R7 Electrical Cables		
	12	1036700004	DC Power Cable length 300 cm, 3 Wires, High Power	25	305
			Optical Attenuators & Adaptors		
	12	0058300000	Optical Attenuator unspecified	46	549
			Optical Cables		
	##	0051000000	Jumper for internal cabling - connector, length and mode not specified	46	11,095
					297,520
					237,320
			Southern Cooridor DWDM System		1
Site	Qty	Model	Description	Price	Extended
			FSP 3000R7 Commons and Shelves		
	7	0078700001	7HU Shelf with Shelf Control Unit and redundant DC PSUs included	2,377	16,642
		0063708410	Network Element Control Unit (NCU2E), 2.5 HU high, 2 RJ45 Ethernet ports, additional	,	
	7	0003708410	RTU license required	650	4,552
	7	1063708463	Optical Supervisory Channel Module with 2 pluggable network ports	782	5,476
	13	0061705993	SFP client I/F for 1510nm, ultra long reach, 125M bit/s only, for use with OSCM -PN and	1,006	13,076
	-	1063708481	OSFM +# 1510 Optical Supervisory Channel Filter Module, 1510 nm	-	
	13			681	8,849
	57	0063709901	Dummy card 5HU	24	1,390
	_		FSP 3000R7 Software and Licenses		
	7	0091700010	Right to use CWDM and DWDM using Access and Core cards	1,372	9,601
	7	1091700040	Right to use GM PLS Control plane functionality	2,530	17,709
			FSP 3000R7 WDM Channel Modules - Core Type		
	7	0063700200	10G Core XPDR with XFP client IF, LR OSNR optimized C-Band Tunable DWDM Network IF, WCC-PCTN-10G-LN# DC	10,150	71,049
			FSP 3000R7 Pluggable Optics		
	7	006 170 18 11	11G XFP I/F for 1310nm, standard reach, 9.953 Gbit/s-11.400 Gbit/s	752	5,263
	/		FSP 3000R7 Optical Filters	752	5,205
			ROADM Module, 2-Degree, WSS-Based, 80 C-Band Wavelengths, 50 GHz/100GHz, with		
	4	1063708310	WSS, 1x2 Power Splitter, and Integrated OPM, ROADM-C80/0/OPM	11,166	44,663
	4	1063708440	Passive Shelf Control Unit	396	1,585
	4	1036000570	PSCU Interface Cable (IEEE1394 type)	24	98
	4	1078708790	40-Channel AWG M ux/Demux, 100 GHz, C-B and, Separate 2 HU shelf	7,610	30,439
			FSP 3000R7 Optical Amplifiers		
	4	1063709050	Optical Amplifier for Booster application, Single Stage 20dBm maximum output power,	4,562	18,247
	4		gain controlled (C-Band) with Dual Monitoring Ports, EDFA-C-S20-GCB-DM	4,302	10,247
	12	1063709051	Optical Amplifier, Double Stage 20 dBm maximum output power, variable gain, gain controlled (C-Band) with Dual Monitoring Ports, EDFA-C-D20-VGC-DM	6,594	79,126
			FSP 3000R7 Dispersion Compensation		
	c	0089000584	Unmanaged Dispersion Compensation for True Wave Reduced Slope Fiber, stand-alone	7 1 5 0	42.046
	6	0003000304	1HU shelf, 80km	7,158	42,946
			FSP 3000R7 Electrical Cables		
	14	1036700004	DC Power Cable length 300 cm, 3 Wires, High Power	25	356
			Optical Attenuators & Adaptors		
	14	0058300000	Optical Attenuator unspecified	46	640
			Optical Cables		
	##	0051000000	Jumper for internal cabling - connector, length and mode not specified	46	12,944
					384,652
			Eastern Cooridor DWDM System		
Site	Qty	Model	Description	Price	Extended
			FSP 3000R7 Commons and Shelves		
	6	0078700001	7HU Shelf with Shelf Control Unit and redundant DC PSUs included	2,377	14,265
	-		Network Element Control Unit (NCU2E), 2.5 HU high, 2 RJ45 Ethernet ports, additional	-	
	6	0063708410	RTU license required	650	3,901
	6	1063708463	Optical Supervisory Channel Module with 2 pluggable network ports	782	4,694
	10	0061705993	SFP client I/F for 1510nm, ultra long reach, 125M bit/s only, for use with OSCM -PN and	1,006	10,058
	-		OSFM +# 1510 Optical Supervisory Channel Filter Module 1510 pm	-	
	10	1063708481	Optical Supervisory Channel Filter Module, 1510 nm	681	6,807
	59	0063709901	Dummy card 5HU	24	1,438



			FSP 3000R7 Software and Licenses		
	6	0091700010	Right to use CWDM and DWDM using Access and Core cards	1,372	8,230
	6	1091700040	Right to use GM PLS Control plane functionality	2,530	15,179
			FSP 3000R7 WDM Channel Modules - Core Type		
	3	0063700200	10G Core XPDR with XFP client IF, LR OSNR optimized C-Band Tunable DWDM Network	10,150	30,450
	3		IF, WCC-PCTN-10G-LN# DC	10,150	50,450
	-	0004704044	FSP 3000R7 Pluggable Optics		
	3	0061701811	11G XFP I/F for 1310nm, standard reach, 9.953 Gbit/s-11.400 Gbit/s	752	2,256
			FSP 3000R7 Optical Filters		
	1	1063708320	ROADM Module, 8-Degree, WSS-Based , 40 C-Band Wavelengths, 100 GHz, with WSS, 1x8 Power Splitter, and Integrated OPM, 8ROADM-C40/0/OPM	17,922	17,922
	1	1063708310	ROADM Module, 2-Degree, WSS-Based, 80 C-Band Wavelengths, 50 GHz/100GHz, with WSS, 1x2 Power Splitter, and Integrated OPM, ROADM-C80/0/OPM	11,166	11,166
	2	1063708440	Passive Shelf Control Unit	396	792
	2	1036000570	PSCU Interface Cable (IEEE1394 type)	24	49
	2	1078708790	40-Channel AWG Mux/Demux, 100 GHz, C-Band, Separate 2HU shelf	7,610	15,220
			FSP 3000R7 Optical Amplifiers		
	2	1063709050	Optical Amplifier for Booster application, Single Stage 20dBm maximum output power, gain controlled (C-Band) with Dual Monitoring Ports, EDFA-C-S20-GCB-DM	4,562	9,124
	10	1063709051	Optical Amplifier, Double Stage 20 dBm maximum output power, variable gain, gain controlled (C-Band) with Dual Monitoring Ports, EDFA-C-D20-VGC-DM	6,594	65,938
			FSP 3000R7 Dispersion Compensation		
	4	0089000586	Unmanaged Dispersion Compensation for True Wave Reduced Slope Fiber, stand-alone 1HU shelf, 120km	8,885	35,540
			FSP 3000R7 Electrical Cables		
	12	1036700004	DC Power Cable length 300 cm, 3 Wires, High Power	25	305
			Optical Attenuators & Adaptors		
	12	0058300000	Optical Attenuator unspecified	46	549
			Optical Cables		
	##	0051000000	Jumper for internal cabling - connector, length and mode not specified	46	11,095
					264,977
					201,577
			Fast AB Cooridor DWDM System		
Site	Otv	/ Model	East AB Cooridor DWDM System Description	Price	Extended
Site	Qty	/ Model	Description	Price	Extended
Site					
Site	Qty 3 3	Model 0078700001 0063708410	Description FSP 3000R7 Commons and Shelves 7HU Shelf with Shelf Control Unit and redundant DC PSUs included Network Element Control Unit (NCU2E), 2.5 HU high, 2 RJ45 Ethernet ports, additional	Price 2,377 650	Extended 7,132 1,951
Site	3	0078700001 0063708410	Description FSP 3000R7 Commons and Shelves 7HU Shelf with Shelf Control Unit and redundant DC PSUs included Network Element Control Unit (NCU2E), 2.5 HU high, 2 RJ45 Ethernet ports, additional RTU license required	2,377 650	7,132 1,951
Site	3 3 3	0078700001 0063708410 1063708463	Description FSP 3000R7 Commons and Shelves 7HU Shelf with Shelf Control Unit and redundant DC PSUs included Network Element Control Unit (NCU2E), 2.5 HU high, 2 RJ45 Ethernet ports, additional RTU license required Optical Supervisory Channel M odule with 2 pluggable network ports	2,377 650 782	7,132 1,951 2,347
Site	3	0078700001 0063708410	Description FSP 3000R7 Commons and Shelves 7HU Shelf with Shelf Control Unit and redundant DC PSUs included Network Element Control Unit (NCU2E), 2.5 HU high, 2 RJ45 Ethernet ports, additional RTU license required	2,377 650	7,132 1,951
Site	3 3 3 4 4	0078700001 0063708410 1063708463 0061705993 1063708481	Description FSP 3000R7 Commons and Shelves 7HU Shelf with Shelf Control Unit and redundant DC PSUs included Network Element Control Unit (NCU2E), 2.5 HU high, 2 RJ45 Ethernet ports, additional RTU license required Optical Supervisory Channel M odule with 2 pluggable network ports SFP client I/F for 1510nm, ultra long reach, 125M bit/s only, for use with OSCM-PN and	2,377 650 782	7,132 1,951 2,347
Site	3 3 3 4 4	0078700001 0063708410 1063708463 0061705993	Description FSP 3000R7 Commons and Shelves 7HU Shelf with Shelf Control Unit and redundant DC PSUs included Network Element Control Unit (NCU2E), 2.5 HU high, 2 RJ45 Ethernet ports, additional RTU license required Optical Supervisory Channel M odule with 2 pluggable network ports SFP client I/F for 1510nm, ultra long reach, 125M bit/s only, for use with OSCM-PN and OSFM +# 1510	2,377 650 782 1,006	7,132 1,951 2,347 4,023
Site	3 3 3 4 4	0078700001 0063708410 1063708463 0061705993 1063708481	Description FSP 3000R7 Commons and Shelves 7HU Shelf with Shelf Control Unit and redundant DC PSUs included Network Element Control Unit (NCU2E), 2.5 HU high, 2 RJ45 Ethernet ports, additional RTU license required Optical Supervisory Channel M odule with 2 pluggable network ports SFP client I/F for 1510nm, ultra long reach, 125M bit/s only, for use with OSCM-PN and OSFM +# 1510 Optical Supervisory Channel Filter M odule, 1510 nm	2,377 650 782 1,006 681	7,132 1,951 2,347 4,023 2,723
Site	3 3 3 4 4	0078700001 0063708410 1063708463 0061705993 1063708481	Description FSP 3000R7 Commons and Shelves 7HU Shelf with Shelf Control Unit and redundant DC PSUs included Network Element Control Unit (NCU2E), 2.5 HU high, 2 RJ45 Ethernet ports, additional RTU license required Optical Supervisory Channel M odule with 2 pluggable network ports SFP client I/F for 1510nm, ultra long reach, 125M bit/s only, for use with OSCM-PN and OSFM +# 1510 Optical Supervisory Channel Filter M odule, 1510 nm Dummy card 5HU	2,377 650 782 1,006 681	7,132 1,951 2,347 4,023 2,723
Site	3 3 3 4 4 29	0078700001 0063708410 1063708463 0061705993 1063708481 0063709901	Description FSP 3000R7 Commons and Shelves 7HU Shelf with Shelf Control Unit and redundant DC PSUs included Network Element Control Unit (NCU2E), 2.5 HU high, 2 RJ45 Ethernet ports, additional RTU license required Optical Supervisory Channel M odule with 2 pluggable network ports SFP client I/F for 1510nm, ultra long reach, 125M bit/s only, for use with OSCM-PN and OSFM +# 1510 Optical Supervisory Channel Filter M odule, 1510 nm Dummy card 5HU FSP 3000R7 Software and Licenses	2,377 650 782 1,006 681 24	7,132 1,951 2,347 4,023 2,723 707
Site	3 3 3 4 4 29 3	0078700001 0063708410 1063708463 0061705993 1063708481 0063709901	Description FSP 3000R7 Commons and Shelves 7HU Shelf with Shelf Control Unit and redundant DC PSUs included Network Element Control Unit (NCU2E), 2.5 HU high, 2 RJ45 Ethernet ports, additional RTU license required Optical Supervisory Channel M odule with 2 pluggable network ports SFP client I/F for 1510nm, ultra long reach, 125M bit/s only, for use with OSCM-PN and OSFM +# 1510 Optical Supervisory Channel Filter M odule, 1510 nm Dummy card 5HU FSP 3000R7 Software and Licenses Right to use CWDM and DWDM using Access and Core cards	2,377 650 782 1,006 681 24 1,372	7,132 1,951 2,347 4,023 2,723 707 4,115
Site	3 3 3 4 4 29 3	0078700001 0063708410 1063708463 0061705993 1063708481 0063709901	Description FSP 3000R7 Commons and Shelves 7HU Shelf with Shelf Control Unit and redundant DC PSUs included Network Element Control Unit (NCU2E), 2.5 HU high, 2 RJ45 Ethernet ports, additional RTU license required Optical Supervisory Channel M odule with 2 pluggable network ports SFP client //F for 1510nm, ultra long reach, 125M bit/s only, for use with OSCM -PN and OSFM +# 1510 Optical Supervisory Channel Filter M odule, 1510 nm Dummy card 5HU FSP 3000R7 Software and Licenses Right to use CWDM and DWDM using Access and Core cards Right to use GM PLS Control plane functionality	2,377 650 782 1,006 681 24 1,372	7,132 1,951 2,347 4,023 2,723 707 4,115
Site	3 3 3 4 4 29 3 3 3	0078700001 0063708410 1063708463 0061705993 1063708481 0063709901 0091700010 1091700040	Description FSP 3000R7 Commons and Shelves 7HU Shelf with Shelf Control Unit and redundant DC PSUs included Network Element Control Unit (NCU2E), 2.5 HU high, 2 RJ45 Ethernet ports, additional RTU license required Optical Supervisory Channel M odule with 2 pluggable network ports SFP client I/F for 1510nm, ultra long reach, 125M bit/s only, for use with OSCM-PN and OSFM ## 1510 Optical Supervisory Channel Filter M odule, 1510 nm Dummy card 5HU Right to use CWDM and DWDM using Access and Core cards Right to use GM PLS Control plane functionality FSP 3000R7 Optical Filters ROADM Module, 8-Degree, WSS-Based , 40 C-Band Wavelengths, 100 GHz, with WSS,	2,377 650 782 1,006 681 24 1,372 2,530	7,132 1,951 2,347 4,023 2,723 707 4,115 7,590
Site	3 3 4 4 29 3 3 3 2	0078700001 0063708410 1063708463 0061705993 1063708481 0063709901 0091700010 1091700040	Description FSP 3000R7 Commons and Shelves 7HU Shelf with Shelf Control Unit and redundant DC PSUs included Network Element Control Unit (NCU2E), 2.5 HU high, 2 RJ45 Ethernet ports, additional RTU license required Optical Supervisory Channel M odule with 2 pluggable network ports SFP client I/F for 1510nm, ultra long reach, 125M bit/s only, for use with OSCM-PN and OSFM ## 1510 Optical Supervisory Channel Filter M odule, 1510 nm Dummy card 5HU Right to use CWDM and DWDM using Access and Core cards Right to use GM PLS Control plane functionality FSP 3000R7 Optical Filters ROADM Module, 8-Degree, WSS-Based , 40 C-Band Wavelengths, 100 GHz, with WSS, 1x8 Power Splitter, and Integrated OPM, 8ROADM-C40/0/OPM	2,377 650 782 1,006 681 24 1,372 2,530 17,922	7,132 1,951 2,347 4,023 2,723 707 4,115 7,590 35,844
Site	3 3 3 4 29 29 3 3 3 3 2 2 2	0078700001 0063708410 1063708463 0061705993 1063708481 0063709901 0091700010 1091700040 1063708320 1063708440	Description FSP 3000R7 Commons and Shelves 7HU Shelf with Shelf Control Unit and redundant DC PSUs included Network Element Control Unit (NCU2E), 2.5 HU high, 2 RJ45 Ethernet ports, additional RTU license required Optical Supervisory Channel M odule with 2 pluggable network ports SFP client I/F for 1510nm, ultra long reach, 125M bit/s only, for use with OSCM-PN and OSFM ## 1510 Optical Supervisory Channel Filter M odule, 1510 nm Dummy card 5HU Right to use CWDM and DWDM using Access and Core cards Right to use GM PLS Control plane functionality FSP 3000R7 Optical Filters ROADM Module, 8-Degree, WSS-Based , 40 C-Band Wavelengths, 100 GHz, with WSS, 1x8 Power Splitter, and Integrated OPM, 8ROADM-C40/0/OPM Passive Shelf Control Unit	2,377 650 782 1,006 681 24 1,372 2,530 17,922 396	7,132 1,951 2,347 4,023 2,723 707 4,115 7,590 35,844 792
Site	3 3 3 4 4 29 3 3 3 3 2 2 2 2 2	0078700001 0063708410 1063708463 0061705993 1063708481 0063709901 0091700010 1091700040 1063708320 1063708320 1063708440 1036000570	Description FSP 3000R7 Commons and Shelves 7HU Shelf with Shelf Control Unit and redundant DC PSUs included Network Element Control Unit (NCU2E), 2.5 HU high, 2 RJ45 Ethernet ports, additional RTU license required Optical Supervisory Channel M odule with 2 pluggable network ports SFP client I/F for 1510nm, ultra long reach, 125M bit/s only, for use with OSCM-PN and OSFM +# 1510 Optical Supervisory Channel Filter M odule, 1510 nm Dummy card 5HU FSP 3000R7 Software and Licenses Right to use CWDM and DWDM using Access and Core cards Right to use GM PLS Control plane functionality FSP 3000R7 Optical Filters ROADM Module, 8-Degree, WSS-Based , 40 C-Band Wavelengths, 100 GHz, with WSS, 1x8 Power Splitter, and Integrated OPM, 8ROADM-C40/0/OPM Passive Shelf Control Unit PSCU Interface Cable (IEEE1394 type)	2,377 650 782 1,006 681 24 1,372 2,530 17,922 396 24	7,132 1,951 2,347 4,023 2,723 707 4,115 7,590 35,844 792 49
Site	3 3 3 4 4 29 3 3 3 3 2 2 2 2 2	0078700001 0063708410 1063708463 0061705993 1063708481 0063709901 0091700010 1091700040 1063708320 1063708320 1063708440 1036000570	Description FSP 3000R7 Commons and Shelves 7HU Shelf with Shelf Control Unit and redundant DC PSUs included Network Element Control Unit (NCU2E), 2.5 HU high, 2 RJ45 Ethernet ports, additional RTU license required Optical Supervisory Channel M odule with 2 pluggable network ports SFP client I/F for 1510nm, ultra long reach, 125M bit/s only, for use with OSCM-PN and OSFM +# 1510 Optical Supervisory Channel Filter M odule, 1510 nm Dummy card 5HU Right to use CWDM and DWDM using Access and Core cards Right to use GM PLS Control plane functionality FSP 3000R7 Optical Filters ROADM Module, 8-Degree, WSS-Based, 40 C-Band Wavelengths, 100 GHz, with WSS, 1x8 Power Splitter, and Integrated OPM, 8ROADM-C40/0/OPM Passive Shelf Control Unit PSCU Interface Cable (IEEE1394 type) 40-Channel AWGM ux/Demux, 100 GHz, C-Band, Separate 2HU shelf	2,377 650 782 1,006 681 24 1,372 2,530 17,922 396 24	7,132 1,951 2,347 4,023 2,723 707 4,115 7,590 35,844 792 49
Site	3 3 3 4 29 3 3 3 3 3 3 2 2 2 2 2 2 2 2	0078700001 0063708410 1063708463 0061705993 1063708481 0063709901 0091700010 1091700040 1063708320 1063708440 1036000570 1078708790	Description FSP 3000R7 Commons and Shelves 7HU Shelf with Shelf Control Unit and redundant DC PSUs included Network Element Control Unit (NCU2E), 2.5 HU high, 2 RJ45 Ethernet ports, additional RTU license required Optical Supervisory Channel M odule with 2 pluggable network ports SFP client I/F for 1510nm, ultra long reach, 125M bit/s only, for use with OSCM-PN and OSFM ## 1510 Optical Supervisory Channel Filter M odule, 1510 nm Dummy card 5HU FSP 3000R7 Software and Licenses Right to use CWDM and DWDM using Access and Core cards Right to use GM PLS Control plane functionality FSP 3000R7 Optical Filters ROADM M odule, 8-Degree, WSS-Based , 40 C-Band Wavelengths, 100 GHz, with WSS, 1x8 Power Splitter, and Integrated OPM, 8ROADM -C40/0/OPM Passive Shelf Control Unit PSCU Interface Cable (IEEE1394 type) 40-Channel AWG Mux/Demux, 100 GHz, C-Band, Separate 2HU shelf FSP 3000R7 Optical Amplifiers Optical Amplifier for Booster application, Single Stage 20dBm maximum output power, Potical Amplifier for Booster application, Single Stage 20dBm maximum output power,	2,377 650 782 1,006 681 24 1,372 2,530 17,922 396 24 7,610	7,132 1,951 2,347 4,023 2,723 707 4,115 7,590 35,844 792 49 15,220
Site	3 3 3 4 29 3 3 3 4 29 3 3 3 3 3 3 3 3 3 3 2 3 3 3 3 3 3 3 3 3 3 3 <	0078700001 0063708410 1063708463 0061705993 1063708481 0063709901 0091700010 1091700040 1063708320 1063708320 1063708440 1036000570 1078708790	Description FSP 3000R7 Commons and Shelves 7HU Shelf with Shelf Control Unit and redundant DC PSUs included Network Element Control Unit (NCU2E), 2.5 HU high, 2 RJ45 Ethernet ports, additional RTU license required Optical Supervisory Channel M odule with 2 pluggable network ports SFP client I/F for 1510nm, ultra long reach, 125M bit/s only, for use with OSCM-PN and OSFM +# 1510 Optical Supervisory Channel Filter M odule, 1510 nm Dummy card 5HU FSP 3000R7 Software and Licenses Right to use CWDM and DWDM using Access and Core cards Right to use GM PLS Control plane functionality FSP 3000R7 Optical Filters ROADM Module, 8-Degree, WSS-Based , 40 C-Band Wavelengths, 100 GHz, with WSS, 1x8 Power Splitter, and Integrated OPM, 8ROADM-C40/0/OPM Passive Shelf Control Unit PSCU Interface Cable (IEEE1394 type) 40-Channel AWG Mux/Demux, 100 GHz, C-Band, Separate 2HU shelf FSP 3000R7 Optical Amplifiers Optical Amplifier for Booster application, Single Stage 20dBm maximum output power, gain controlled (C-Band) with Dual M onitoring Ports, EDFA-C-S20-GCB-DM Optical Amplifier, Double Stage 20 dBm maximum output power, variable gain, gain	2,377 650 782 1,006 681 24 1,372 2,530 17,922 396 24 7,610	7,132 1,951 2,347 4,023 2,723 707 4,115 7,590 35,844 792 49 15,220 9,124
Site	3 3 3 4 29 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 3 3 3 3 <t< td=""><td>0078700001 0063708410 1063708463 0061705993 1063708481 0063709901 0091700010 1091700040 1063708320 1063708440 1036000570 1078708790 1063709050 1063709050</td><td>Description FSP 3000R7 Commons and Shelves 7HU Shelf with Shelf Control Unit and redundant DC PSUs included Network Element Control Unit (NCU2E), 2.5 HU high, 2 RJ45 Ethernet ports, additional RTU license required Optical Supervisory Channel M odule with 2 pluggable network ports SFP client I/F for 1510nm, ultra long reach, 125M bit/s only, for use with OSCM-PN and OSFM +# 1510 Optical Supervisory Channel Filter M odule, 1510 nm Dummy card 5HU FSP 3000R7 Software and Licenses Right to use CWDM and DWDM using Access and Core cards Right to use GM PLS Control plane functionality FSP 3000R7 Optical Filters ROADM Module, 8-Degree, WSS-Based , 40 C-Band Wavelengths, 100 GHz, with WSS, 1x8 Power Splitter, and Integrated OPM, 8ROADM-C40/0/OPM Passive Shelf Control Unit PSCU Interface Cable (IEEE1394 type) 40-Channel AWG Mux/Demux, 100 GHz, C-Band, Separate 2HU shelf FSP 3000R7 Optical Amplifiers Optical Amplifier for Booster application, Single Stage 20dBm maximum output power, gain controlled (C-Band) with Dual Monitoring Ports, EDFA-C-S20-CB-DM Optical Amplifier, Double Stage 20 dBm maximum output power, variable gain, gain controlled (C-Band) with Dual Monitoring Ports, EDFA-C-D20-VGC-DM FSP 3000R7 Dispersion Compensation Ummanaged Dispersion Comp</td><td>2,377 650 782 1,006 681 24 1,372 2,530 17,922 396 24 7,610 4,562 6,594</td><td>7,132 1,951 2,347 4,023 2,723 707 4,115 7,590 35,844 792 49 15,220 9,124 26,375</td></t<>	0078700001 0063708410 1063708463 0061705993 1063708481 0063709901 0091700010 1091700040 1063708320 1063708440 1036000570 1078708790 1063709050 1063709050	Description FSP 3000R7 Commons and Shelves 7HU Shelf with Shelf Control Unit and redundant DC PSUs included Network Element Control Unit (NCU2E), 2.5 HU high, 2 RJ45 Ethernet ports, additional RTU license required Optical Supervisory Channel M odule with 2 pluggable network ports SFP client I/F for 1510nm, ultra long reach, 125M bit/s only, for use with OSCM-PN and OSFM +# 1510 Optical Supervisory Channel Filter M odule, 1510 nm Dummy card 5HU FSP 3000R7 Software and Licenses Right to use CWDM and DWDM using Access and Core cards Right to use GM PLS Control plane functionality FSP 3000R7 Optical Filters ROADM Module, 8-Degree, WSS-Based , 40 C-Band Wavelengths, 100 GHz, with WSS, 1x8 Power Splitter, and Integrated OPM, 8ROADM-C40/0/OPM Passive Shelf Control Unit PSCU Interface Cable (IEEE1394 type) 40-Channel AWG Mux/Demux, 100 GHz, C-Band, Separate 2HU shelf FSP 3000R7 Optical Amplifiers Optical Amplifier for Booster application, Single Stage 20dBm maximum output power, gain controlled (C-Band) with Dual Monitoring Ports, EDFA-C-S20-CB-DM Optical Amplifier, Double Stage 20 dBm maximum output power, variable gain, gain controlled (C-Band) with Dual Monitoring Ports, EDFA-C-D20-VGC-DM FSP 3000R7 Dispersion Compensation Ummanaged Dispersion Comp	2,377 650 782 1,006 681 24 1,372 2,530 17,922 396 24 7,610 4,562 6,594	7,132 1,951 2,347 4,023 2,723 707 4,115 7,590 35,844 792 49 15,220 9,124 26,375
Site	3 3 3 4 29 3 3 3 4 29 3 3 3 3 3 3 3 3 3 3 2 3 3 3 3 3 3 3 3 3 3 3 <	0078700001 0063708410 1063708463 0061705993 1063708481 0063709901 0091700010 1091700040 1063708320 1063708320 1063708440 1036000570 1078708790	Description FSP 3000R7 Commons and Shelves 7HU Shelf with Shelf Control Unit and redundant DC PSUs included Network Element Control Unit (NCU2E), 2.5 HU high, 2 RJ45 Ethernet ports, additional RTU license required Optical Supervisory Channel M odule with 2 pluggable network ports SFP client I/F for 1510nm, ultra long reach, 125M bit/s only, for use with OSCM -PN and OSFM +# 1510 Optical Supervisory Channel Filter M odule, 1510 nm Dummy card 5HU FSP 3000R7 Software and Licenses Right to use CWDM and DWDM using Access and Core cards Right to use GM PLS Control plane functionality FSP 3000R7 Optical Filters ROADM Module, 8-Degree, WSS-Based , 40 C-Band Wavelengths, 100 GHz, with WSS, 1x8 Power Splitter, and Integrated OPM, 8ROADM -C40/0/OPM Passive Shelf Control Unit PSCU Interface Cable (IEEE1394 type) 40-Channel AWG Mux/Demux, 100 GHz, C-Band, Separate 2HU shelf FSP 3000R7 Optical Amplifiers Optical Amplifier for Booster application, Single Stage 20dBm maximum output power, gain controlled (C-Band) with Dual M onitoring Ports, EDFA-C-S20-GCB-DM Optical Amplifier, Double Stage 20 dBm maximum output power, variable gain, gain controlled (C-Band) with Dual M onitoring Ports, EDFA-C-D20-VGC-DM FSP 3000R7 Dispersion Compensation Ummanaged Dispersion Compensation for True Wave Reduced Slope Fiber, stand-alone 1HU shelf,	2,377 650 782 1,006 681 24 1,372 2,530 17,922 396 24 7,610	7,132 1,951 2,347 4,023 2,723 707 4,115 7,590 35,844 792 49 15,220 9,124
Site	3 3 3 4 29 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 3 3 3 3 <t< td=""><td>0078700001 0063708410 1063708463 0061705993 1063708481 0063709901 0091700010 1091700040 1063708320 1063708440 1036000570 1078708790 1063709050 1063709050</td><td>Description FSP 3000R7 Commons and Shelves 7HU Shelf with Shelf Control Unit and redundant DC PSUs included Network Element Control Unit (NCU2E), 2.5 HU high, 2 RJ45 Ethernet ports, additional RTU license required Optical Supervisory Channel M odule with 2 pluggable network ports SFP client I/F for 1510nm, ultra long reach, 125M bit/s only, for use with OSCM-PN and OSFM +# 1510 Optical Supervisory Channel Filter M odule, 1510 nm Dummy card 5HU FSP 3000R7 Software and Licenses Right to use CWDM and DWDM using Access and Core cards Right to use GM PLS Control plane functionality FSP 3000R7 Optical Filters ROADM Module, 8-Degree, WSS-Based, 40 C-Band Wavelengths, 100 GHz, with WSS, 1x8 Power Splitter, and Integrated OPM, 8ROADM-C40/0/OPM Passive Shelf Control Unit PSCU Interface Cable (IEEE1394 type) 40-Channel AWG Mux/Demux, 100 GHz, C-Band, Separate 2HU shelf FSP 3000R7 Optical Amplifiers Optical Amplifier for Booster application, Single Stage 20 dBm maximum output power, gain controlled (C-Band) with Dual Monitoring Ports, EDFA-C-D20-VGC-DM FSP 3000R7 Dispersion Compensation Unmanaged Dispersion Compensation for True Wave Reduced Slope Fiber, stand-alone 1HU shelf, 80km</td><td>2,377 650 782 1,006 681 24 1,372 2,530 17,922 396 24 7,610 4,562 6,594</td><td>7,132 1,951 2,347 4,023 2,723 707 4,115 7,590 35,844 792 49 15,220 9,124 26,375</td></t<>	0078700001 0063708410 1063708463 0061705993 1063708481 0063709901 0091700010 1091700040 1063708320 1063708440 1036000570 1078708790 1063709050 1063709050	Description FSP 3000R7 Commons and Shelves 7HU Shelf with Shelf Control Unit and redundant DC PSUs included Network Element Control Unit (NCU2E), 2.5 HU high, 2 RJ45 Ethernet ports, additional RTU license required Optical Supervisory Channel M odule with 2 pluggable network ports SFP client I/F for 1510nm, ultra long reach, 125M bit/s only, for use with OSCM-PN and OSFM +# 1510 Optical Supervisory Channel Filter M odule, 1510 nm Dummy card 5HU FSP 3000R7 Software and Licenses Right to use CWDM and DWDM using Access and Core cards Right to use GM PLS Control plane functionality FSP 3000R7 Optical Filters ROADM Module, 8-Degree, WSS-Based, 40 C-Band Wavelengths, 100 GHz, with WSS, 1x8 Power Splitter, and Integrated OPM, 8ROADM-C40/0/OPM Passive Shelf Control Unit PSCU Interface Cable (IEEE1394 type) 40-Channel AWG Mux/Demux, 100 GHz, C-Band, Separate 2HU shelf FSP 3000R7 Optical Amplifiers Optical Amplifier for Booster application, Single Stage 20 dBm maximum output power, gain controlled (C-Band) with Dual Monitoring Ports, EDFA-C-D20-VGC-DM FSP 3000R7 Dispersion Compensation Unmanaged Dispersion Compensation for True Wave Reduced Slope Fiber, stand-alone 1HU shelf, 80km	2,377 650 782 1,006 681 24 1,372 2,530 17,922 396 24 7,610 4,562 6,594	7,132 1,951 2,347 4,023 2,723 707 4,115 7,590 35,844 792 49 15,220 9,124 26,375
Site	3 3 3 4 29 3 3 3 4 29 3 3 3 3 3 3 3 3 3 3 3 3 3 3 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 3 3 3 3 3 3 3 3 3 3 3 3 3 <td>0078700001 0063708410 1063708463 0061705993 1063708481 0063709901 0091700010 1091700040 1063708320 1063708440 1036000570 1078708790 1063709050 1063709050</td> <td>Description FSP 3000R7 Commons and Shelves 7HU Shelf with Shelf Control Unit and redundant DC PSUs included Network Element Control Unit (NCU2E), 2.5 HU high, 2 RJ45 Ethernet ports, additional RTU license required Optical Supervisory Channel M odule with 2 pluggable network ports SFP client I/F for 1510nm, ultra long reach, 125M bit/s only, for use with OSCM-PN and OSFM +# 1510 Optical Supervisory Channel Filter M odule, 1510 nm Dummy card 5HU FSP 3000R7 Software and Licenses Right to use CWDM and DWDM using Access and Core cards Right to use GM PLS Control plane functionality FSP 3000R7 Optical Filters ROADM Module, 8-Degree, WSS-Based, 40 C-Band Wavelengths, 100 GHz, with WSS, tx8 Power Splitter, and Integrated OPM, 8ROADM-C40/0/OPM Passive Shelf Control Unit PSCU Interface Cable (IEEE1394 type) 40-Channel AWG M ux/Demux, 100 GHz, C-Band, Separate 2HU shelf FSP 3000R7 Optical Amplifiers Optical Amplifier for Booster application, Single Stage 20dBm maximum output power, gain controlled (C-Band) with Dual M onitoring Ports, EDFA-C-D20-VGC-DM Optical Amplifier, Double Stage 20 dBm maximum output power, variable gain, gain controlled (C-Band) with Dual M onitoring Ports, EDFA-C-D20-VGC-DM Optical Amplifier, Double Stage 20 dBm maximum output power, stand-alone HU she</td> <td>2,377 650 782 1,006 681 24 7,530 17,922 396 24 7,610 4,562 6,594</td> <td>7,132 1,951 2,347 4,023 2,723 707 4,115 7,590 35,844 792 49 15,220 9,124 26,375</td>	0078700001 0063708410 1063708463 0061705993 1063708481 0063709901 0091700010 1091700040 1063708320 1063708440 1036000570 1078708790 1063709050 1063709050	Description FSP 3000R7 Commons and Shelves 7HU Shelf with Shelf Control Unit and redundant DC PSUs included Network Element Control Unit (NCU2E), 2.5 HU high, 2 RJ45 Ethernet ports, additional RTU license required Optical Supervisory Channel M odule with 2 pluggable network ports SFP client I/F for 1510nm, ultra long reach, 125M bit/s only, for use with OSCM-PN and OSFM +# 1510 Optical Supervisory Channel Filter M odule, 1510 nm Dummy card 5HU FSP 3000R7 Software and Licenses Right to use CWDM and DWDM using Access and Core cards Right to use GM PLS Control plane functionality FSP 3000R7 Optical Filters ROADM Module, 8-Degree, WSS-Based, 40 C-Band Wavelengths, 100 GHz, with WSS, tx8 Power Splitter, and Integrated OPM, 8ROADM-C40/0/OPM Passive Shelf Control Unit PSCU Interface Cable (IEEE1394 type) 40-Channel AWG M ux/Demux, 100 GHz, C-Band, Separate 2HU shelf FSP 3000R7 Optical Amplifiers Optical Amplifier for Booster application, Single Stage 20dBm maximum output power, gain controlled (C-Band) with Dual M onitoring Ports, EDFA-C-D20-VGC-DM Optical Amplifier, Double Stage 20 dBm maximum output power, variable gain, gain controlled (C-Band) with Dual M onitoring Ports, EDFA-C-D20-VGC-DM Optical Amplifier, Double Stage 20 dBm maximum output power, stand-alone HU she	2,377 650 782 1,006 681 24 7,530 17,922 396 24 7,610 4,562 6,594	7,132 1,951 2,347 4,023 2,723 707 4,115 7,590 35,844 792 49 15,220 9,124 26,375

			Optical Attenuators & Adaptors		
	6	0058300000	Optical Attenuator unspecified	46	274
			Optical Cables		
	##	0051000000	Jumper for internal cabling - connector, length and mode not specified	46	5,548
					153,461
			Northern Cooridor DWDM System		
Site	Qty	Model	Description	Price	Extended
			FSP 3000R7 Commons and Shelves		
	5	0078700001	7HU Shelf with Shelf Control Unit and redundant DC PSUs included	2,377	11,887
	5	0063708410	Network Element Control Unit (NCU2E), 2.5 HU high, 2 RJ45 Ethernet ports, additional RTU license required	650	3,251
	5	1063708463	Optical Supervisory Channel Module with 2 pluggable network ports	782	3,912
	8	0061705993	SFP client I/F for 1510nm, ultra long reach, 125M bit/s only, for use with OSCM -PN and OSFM +# 1510	1,006	8,047
	8	1063708481	Optical Supervisory Channel Filter Module, 1510 nm	681	5,446
	48	0063709901	Dummy card 5HU	24	1,170
			FSP 3000R7 Software and Licenses		
	5	0091700010	Right to use CWDM and DWDM using Access and Core cards	1,372	6,858
	5	1091700040	Right to use GM PLS Control plane functionality	2,530	12,649
			FSP 3000R7 WDM Channel Modules - Core Type		
	2	0063700200	10G Core XPDR with XFP client IF, LR OSNR optimized C-Band Tunable DWDM Network IF, WCC-PCTN-10G-LN# DC	10,150	20,300
			FSP 3000R7 Pluggable Optics		
	2	0061701811	11G XFP I/F for 1310nm, standard reach, 9.953 Gbit/s-11.400 Gbit/s	752	1,504
			FSP 3000R7 Optical Filters		
	1	1063708320	ROADM Module, 8-Degree, WSS-Based, 40 C-Band Wavelengths, 100 GHz, with WSS, 1x8 Power Splitter, and Integrated OPM, 8ROADM-C40/0/OPM	17,922	17,922
	1	1063708310	ROADM Module, 2-Degree, WSS-Based, 80 C-Band Wavelengths, 50 GHz/100GHz, with WSS, 1x2 Power Splitter, and Integrated OPM, ROADM-C80/0/OPM	11,166	11,166
	2	1063708440	Passive Shelf Control Unit	396	792
	2	1036000570	PSCU Interface Cable (IEEE1394 type)	24	49
	2	1078708790	40-Channel AWG M ux/Demux, 100 GHz, C-B and, Separate 2 HU shelf	7,610	15,220
			FSP 3000R7 Optical Amplifiers		
	2	1063709050	Optical Amplifier for Booster application, Single Stage 20dBm maximum output power, gain controlled (C-Band) with Dual Monitoring Ports, EDFA-C-S20-GCB-DM Optical Amplifier, Dauble Stage 20d Bm maximum output power, writeble acting acting	4,562	9,124
l	8	1063709051	Optical Amplifier, Double Stage 20 dBm maximum output power, variable gain, gain controlled (C-Band) with Dual Monitoring Ports, EDFA-C-D20-VGC-DM	6,594	52,751
			FSP 3000R7 Dispersion Compensation		
	6	0089000585	Unmanaged Dispersion Compensation for True Wave Reduced Slope Fiber, stand-alone 1HU shelf, 100km	8,021	48,128
			FSP 3000R7 Electrical Cables		
	10	1036700004	DC Power Cable length 300 cm, 3 Wires, High Power	25	254
			Optical Attenuators & Adaptors		
	10	0058300000	Optical Attenuator unspecified	46	457
			Optical Cables		
	##	0051000000	Jumper for internal cabling - connector, length and mode not specified	46	9,246
					240,132
			DWDM System Spares		<u>.</u>
Site	Qty	Model	Description	Price	Extended
-			FSP 3000R7 Commons and Shelves		
	1	0078700001	7HU Shelf with Shelf Control Unit and redundant DC PSUs included	2,377	2,377
	1	0063708410	Network Element Control Unit (NCU2E), 2.5 HU high, 2 RJ45 Ethernet ports, additional RTU license required	650	650
l	1	1063708463	Optical Supervisory Channel Module with 2 pluggable network ports	782	782
	_	0061705993	SFP client I/F for 1510nm, ultra long reach, 125M bit/s only, for use with OSCM -PN and		
	1		OSFM +# 1510	1,006	1,006
	1	1063708481	Optical Supervisory Channel Filter Module, 1510 nm	681	681
			FSP 3000R7 WDM Channel Modules - Core Type		
l	1	0063700200	10G Core XPDR with XFP client IF, LR OSNR optimized C-Band Tunable DWDM Network IF, WCC-PCTN-10G-LN# DC	10,150	10,150



			FSP 3000R7 Pluggable Optics		
	1	006 170 18 11	11G XFP I/F for 1310nm, standard reach, 9.953 Gbit/s-11.400 Gbit/s	752	752
			FSP 3000R7 Optical Filters		
	1	1063708320	ROADM Module, 8-Degree, WSS-Based , 40 C-Band Wavelengths, 100 GHz, with WSS, 1x8 Power Splitter, and Integrated OPM, 8ROADM-C40/0/OPM	17,922	17,92
	1	1063708310	ROADM Module, 2-Degree, WSS-Based, 80 C-Band Wavelengths, 50 GHz/100GHz, with WSS, 1x2 Power Splitter, and Integrated OPM, ROADM-C80/0/OPM	11,166	11,16
	1	1063708440	Passive Shelf Control Unit	396	39
	1	1036000570	PSCU Interface Cable (IEEE1394 type)	24	2
	1	1078708790	40-Channel AWG M ux/Demux, 100 GHz, C-B and, Separate 2 HU shelf	7,610	7,61
			FSP 3000R7 Optical Amplifiers		
	1	1063709050	Optical Amplifier for Booster application, Single Stage 20dBm maximum output power, gain controlled (C-Band) with Dual Monitoring Ports, EDFA-C-S20-GCB-DM	4,562	4,56
	1	1063709051	Optical Amplifier, Double Stage 20 dBm maximum output power, variable gain, gain controlled (C-Band) with Dual Monitoring Ports, EDFA-C-D20-VGC-DM	6,594	6,59
			DWDM Software Operating System		64,67
Site	Qty	Model	Description	Price	Extended
Site	QLy	WIDGEI	FSP Network Manager	FILE	Extended
	-	0091001200	FSP Network Manager Server License (Solaris 9/10)	2,540	2,54
	-	1091002010	FSP Network Manager Connection Licenses for 5 shelves of type FSP 3000R7	7,620	60,96
	-	1091002510	FSP Service Manager Connection Licenses for 5 shelves of type FSP 3000R7	7,620	60,96
				7,020	
			DWDM System Maintenance		124,46
Site	Qty Model Description		Price	Extended	
Site		Bronz	Annual Maintenance	129,223	129,22
	1	BIOIL		129,223	129,22
			40 Wave DWDM Optical Netwo	ork Total	2,282,947
	10	Traverse 2000	Transport Equipment - Configuration for lower density Interconnect CO'	110,759	1,107,59
			Force10 Network Traverse 2000 M ultiprotocol Optical/Switching System		
			OC-192 Optical Network Transport system with Add/Drop Mutiplexing & DCS		
			Accommodates 112 DS1's, 2 -GE Interfaces, 16 10/100 Interfaces, 1 OC-48 Port, 12 DS3 Interfaces	faces	
	5	Traverse 2000	Transport Equipment - Configuration for higher density Interconnect CO	s	
			Force10 Network Traverse 2000 M ultiprotocol Optical/Switching System	236,687	1,183,43
			OC-192 Optical Network Transport system with Add/Drop Mutiplexing & DCS		
			Accommodates 112 DS1's, 12 -GE Interfaces, 16 10/100 Interfaces, 1 OC-48 Port, 48 DS3 Inter	erfaces,	
			4 OC-12 & 8 OC3 Interfaces		
	1		Transport Equipment Maintenance Spares - common spares for all sites	124,381	124,38
			Multiprotocol Optical/Switching System Total		2,415,40
			System Total		

• All expenses are to be 20% supported by cash matching funds.



11. Miscellaneous

• \$131,324

- This category includes computers for the three new engineers and the grant administrator that will be working directly and exclusively on the project. It also includes cell phones for the engineers.
- The computers are estimated at \$2,100 each. The cell phones are estimated at \$80/month including the initial startup charges based upon current corporate usage and have an estimated total of \$8,640.
- \$40,784 is estimated for fiber splicing, OTDR, and optical installation and management training for Merit and partner engineering staff. These expenses are based upon known costs for the training classes and the number of engineers that will be participating.
- \$50,000 for the OTDR and OSA testing equipment. Optical Time-Domain Reflectometer, an optoelectronic instrument used to characterize an optical fiber, is used for estimating a fiber's length and overall attenuation, including splice and mated-connector losses. It may also be used to locate faults, such as breaks, and to measure optical return loss and to evaluate the quality of a connection during installation, maintenance and repair. Optical Spectrum Analyzer, a device used to examine the spectral composition of an optical signal, displays a power measure of each frequency component over a given frequency range, changing the display as the properties of the signal change. Used to evaluate the quality of a communications channel signal during installation and repair. Vendor will be performing this service and cost is based upon the vendor estimates.
- There is also \$7,500 of cost for network management of the optical transport equipment. The \$7500 is the cost for the Network Management appliance and software for the optical transport system LYNX will be operating. This is the one time cost to purchase the software and hardware to run the software to operate the management system. This cost comes from a vendor quote.
- Merit hired a consultant during the award preparation to review unserved and underserved locations. The cost, \$16,000, is taken directly from the invoice.
- All expenses are to be 20% supported by cash matching funds.

<u>Addendum</u>

Except for fringe benefits no other indirect costs are included in the budget.

Merit's fringe benefit package is controlled by the University of Michigan since all Merit employees are contracted to Merit from the university per a five year hosting agreement. No Merit employee has access to special packages or rates. The package includes the employer's portion of FICA, pro rata health insurance subsidy, and dental insurance, group insurance, retirement plan, long-term disability, and 1.9% for university administration of the programs. The university rates currently average 28.5% per dollar of salary. This is the rate that was used to estimate total salary and fringe benefits for new positions. For current staffing their known rate was applied.

The fringe benefit costs included in the salary rates refers only to this package. It does not include any other indirect costs, (i.e.) overhead, facilities, general or administrative, etc.