



SBC-002-316-026

SingleMode Passive Wavelength Division Multiplexing (WDM) M&P

Abstract

Presented in this document are the methods and procedures to implement a 3 λ Wavelength Division Multiplexing (WDM) Modules deployed within the SBC-13STATE Network.

Audience: The primary audience for this document are SBC-13STATE personnel in the following disciplines, Switch Capacity Planner/Engineer, Transport Equipment Engineer (TEE), Facility Equipment Engineer (FEE), Digital Transport Engineer (DTE), Maintenance Engineer, Space Planner, Frame Planner, Long Range Technical Planners, Circuit Provisioning, Outside Plant Engineering, Network Operations (LFO) and Fundamental Network Planning. . This document is to be used internally within SBC-13STATE and their Authorized Vendors and have a limited distribution subject to the header/footer information.

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1. Reasons for Reissue

Issue 3, Section 6, Paragraph B1: Statement reflecting the need to test the Fiber prior to the placement of the WDM product to insure that it will be suitable for use.

Issue 3, Section-All; PAN numbers changed for the WDM products due to PAN II system. No change on approvals, authorizations and PIDs. (The original PANs can be found on the Common Systems Web Site.

Issue 3, Section 5, Paragraph D3: Parts list applications provided along with an illustration.

Issue 3, Section 7, Paragraph B: PICS Administration including new Configuration Code.

Issue 3, Section 7, Paragraph B: No Maintenance Spares needed at the Central Office.

Issue 3, Section 8, Paragraph F9: Fujitsu OC-48 UPSR East Function Code corrected from FS3CNNN2C to FS3CNNN1C.

Issue 3, Section 9: Reference Section updated in its entirety.

Issue 2, Section 8, Paragraph 4: Changed VLM1XV0B to **VLM1VX0D**.

Issue 2, Section 8, Paragraph 6.8: Posted CD updated.

Issue 2, Section 8, Paragraph 6.9: New, Fujitsu OC-48 Transmission Requirements.

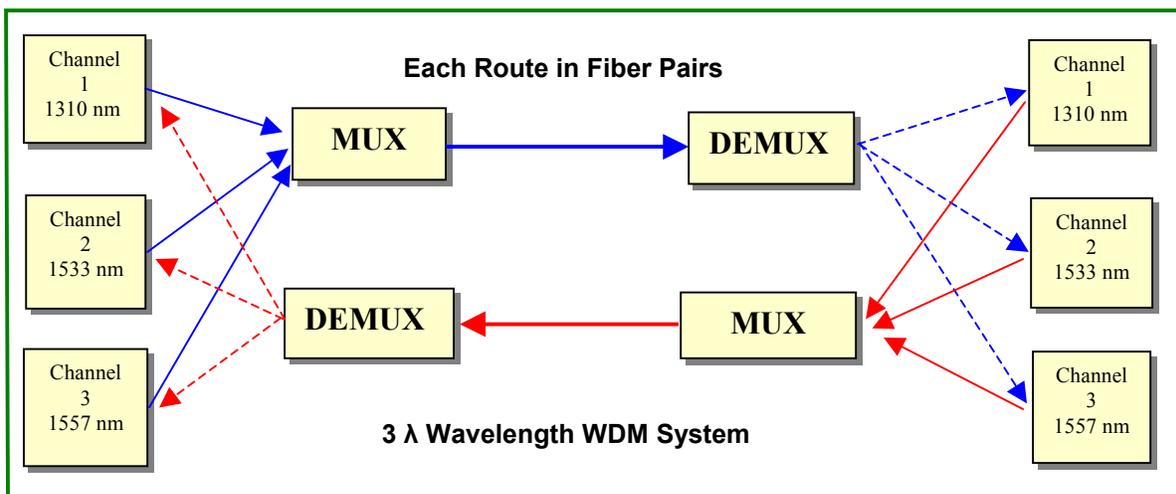
Issue 1: This M&P replaces and supercedes the Pacific Bell M&P 97-07, ADC Telecommunications WDM 3 Wavelength Coupler and the written materials found within PBEL 3210, both originally dated February 1997.

PAN 20011069, SBC Standard WDM Couplers, issued July 2001 replaces PBEL 3210 in its entirety. PAN 20011068 Destandardizes PBEL 3210. This PAN also supercedes all temporary or previous standard 3λ Wavelength WDM Interoffice & Loop applications provided in SBC-Southwestern Bell Telephone, SBC-Ameritech, SBC-Southern New England Telephone, SBC-Pacific Bell & SBC-Nevada Bell.

2. Introduction

Wavelength Division Multiplexing (WDM) is a method of combining multiple optical signals on a single fiber strand. WDM devices are optical glass devices that incorporate bandpass technology to provide the multiple optical transmission paths, in both uni-directional and bi-directional transmission configurations. WDM is not an active device such as the Optical Frequency Division Multiplexing (FDM) or Dense Wavelength Division Multiplexing (DWDM).

Wavelength Division Multiplexing (WDM) increases the total capacity of a single fiber strand. WDM devices at each end of a fiber span allow several optical signals to travel through a single fiber strand without interfering with each other when the proper precautions are taken. The ADC Telecommunications Inc. SingleMode Passive 3 λ (lambda) wavelength WDM Couplers will permit three optical signals to travel through a single fiber strand for a given direction of transmission. These units are "passive" in that they have no electronic or optical regenerative components. Optical prisms within the couplers are used to MUX and DEMUX the optical signals.



FDM and DWDM use an active multiplexing technique that transports many channels on a single optical carrier or wavelength. Multiple subcarriers are combined together resulting in a composite optical signal that is used to modulate the intensity of the light from a single laser transmitter.

The transmission paths for all **SBC-13STATE** Network optical components will use the SingleMode equipment, cable and connectors. **DO NOT USE MultiMode COMPONENTS in the SBC Network under any circumstances.**

3. Wavelength Division Multiplexing Equipment

3A. Deployment Strategy

The only WDM approved for use within **SBC-13STATE** is the ADC 3 Wavelength (λ) WDM Coupler (1310/1533/1557 nm) that is now available for use throughout SBC in the vertical configuration. The previous product used in SBC-Pacific Bell, reference PBEL 3210 has been discontinued.

WDM couplers are optical glass devices that multiplex and de-multiplex multiple wavelengths on a single pair of fiber stands. WDM couplers are packaged and mounted in an ADC Module Shelf (vertical version) which is placed within the Fiber Distributing Frame (FDF). The current coupler multiplexes 1310nm, 1533nm and 1557nm. Each coupler port provides for the unidirectional or bi-directional transmission of a single SONET line at a specific wavelength. The optics used for transmission or receipt of the signal must match the specified wavelength of the coupler port. The transmission or receipt Network Elements must be able to process the port frequency assigned to it.

Network Planning & Engineering Fundamental Planning directs the strategy of deployment to follow priorities of deployment in the order stated below:

1. Deploy Dense Multiplexing Wavelength Division Multiplexing (DWDM)
2. Deploy OC-192 Carrier Systems
3. Deploy OC-48 systems and roll slow speed (OC-1, OC-3, OC-03C, and OC12) services to these higher speed systems to spare up fiber strand capacity.
4. Place more Fiber Interoffice Cable Facilities.
5. On a temporary short-term basis not to exceed one year use Wavelength Division Multiplexer Modules (WDM).

The trigger for deploying WDM technology and the associated hardware components is to increase the effective capacity of the existing fiber cables thus temporarily deferring fiber relief projects. The passive WDM product should only be used as a last resort and should be considered only on the following conditions:

1. Placement of fiber is not viable before the ready-for-service date
2. Fiber cannot support OC-192 or higher services
3. DWDM is not yet available or the fiber cannot support DWDM
4. There are no low-speed SONET (OC3 or OC12) systems that can be rolled to a higher-speed SONET system (OC48 or OC192)
5. Budget pressures preclude deploying any other electronic fiber gain solution before the ready for service date

The passive WDM is not a permanent solution. It is to be removed from the network whenever economically feasible and viable. The WDM removal will be feasible after a new fiber cable has been placed in the same route. **The WDM shall be removed within 12 months after the cable has been inventoried in TIRKS.** Reference SBC-13STATE Fundamental Planning Memorandum PM 050801017Th.

3B. Optical Terminators

FiberOptic Terminators are to be placed on all unterminated ports of WDM modules that are in use with any transmission speeds in order to reduce the negative effects of optical signal reflectance. It is recommended that terminators be placed on all unterminated ports of these splitters when they are not connected with a fiber jumper. In any case, any active signal, regardless of transmission speed or capacity, should have the end caps placed on all unterminated access points in the circuit.

3C. Approved Manufacturer

ADC Telecommunication’s WDM Coupler is rated as Standard for Use in accordance with PAN 20011069, dated September 2001. All other suppliers’ WDM products are non-standard and will not be used in the SBC network and should be removed on an expedited going-forward basis. ADC’s family of products exceeds the Telcordia (formerly Bellcore), SBC Technology Resources Incorporated (TRI) and SBC Services Inc, Network Planning & Engineering specifications for use and shall not be substituted by a non-rated product within the SBC Network. This product introduction will be introduced in a SC-UPC connector only. As a new product to meet the going-forward standard of SBC, the old standard of the ST-UPC in SBC-Southwestern Bell Telephone will not be provided.

	SBC-SWBT	SBC-Nevada Bell	SBC-Pacific Bell	SBC- Ameritech	SBC-SNET
WDM ST-UPC 3λ Signal	Not Approved				
WDM ST-UPC 2λ Signal	Not Approved	Not Approved	Not Approved	Not Approved	Not Approved
Vertical WDM SC-UPC 3λ Signal	Approved for Use September 2001				
Horizontal WDM SC-UPC 3λ Signal	Not Approved	Not Approved	Approved until August 2001(1)	Not Approved	Not Approved
WDM SC-UPC 2λ Signal	Not Approved	Not Approved	Not Approved	Not Approved	Not Approved

λ - Wavelength Frequency of optical transmission

(1) PAN 20011068, dated September 2001 removes this offering from availability in any region. Replaced by PAN 20011069.

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3D. Attenuators

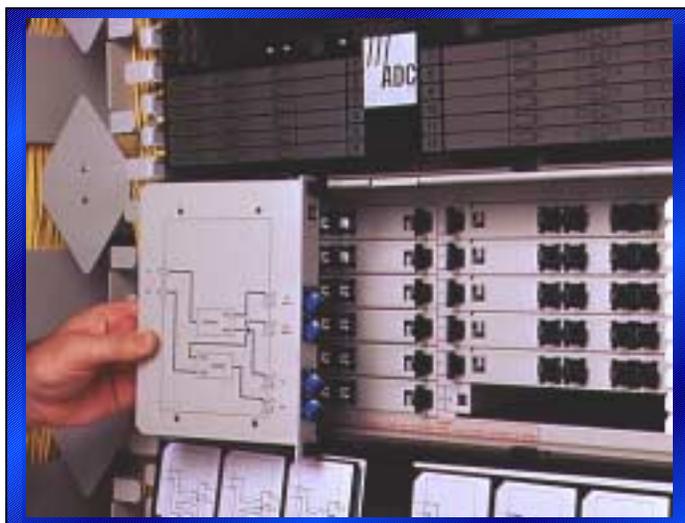
Attenuators are placed at the Fiber Distributing Frame (FDF) panel supporting the Network Element. FOT and OSP panels in the FDF normally are ordered with a 0-dB attenuation. The connector may be changed in the FDF and replaced with the proper attenuator in the connector socket to pad the signal in 5-dB increments. These “Bulkhead” attenuators are flush mounted with the panel face and are color coded for proper use. In addition, “In-Line” attenuators may be placed to pad the signal and shall only be placed between the FOT panel and the fiber cross-connect jumper. Never place an attenuator between two fiber optic patchcords in the Fiber Protection System (Yellow Raceway) or the FDF troughs; place in the FOT panel itself. Attenuators should not be placed on the Network Element equipment side of the FiberOptic patchcord except under unusual circumstances where the fiber connections are secured from incidental hazards and potential service outages. **Do not place an attenuator on the front connectors of FiberOptic WDM Couplers.**

4. Placement of WDM Modules in the Network

4A. Embedded SBC-Pacific Bell Version

The embedded VAM shelf within SBC-Pacific Bell houses 12 horizontal mounted modules or cards. Each module may have one WDM coupler in each module capable of handling the potential of three systems on three channels. PAN 20011068, dated September 2001 deleted the existing horizontal mount shelf and modules effective August 2001. This product was originally approved for use in SBC-Pacific Bell only under PBEL 3210 dated Feb 1997. Horizontal modules may continue to be purchased to finish out existing horizontal mounted shelves until the existing manufactured stock is exhausted. Future orders of these products will be automatically substituted with the new **SBC-13STATE** WDM Modules under the auspices of the new PAN. All new miscellaneous shelf additions in Pacific Bell will use the new SBC standard vertical mounted FDF shelves.

It takes two WDM modules per site, per path route. One WDM card, the MUX card, is the TRANSMIT path from the serving C.O. and sends the three combined signals downstream. The other card, the DEMUX card, supports the RECEIVE path to the serving C.O. and breaks out the three optical signals from the upstream combined WDM signal.



Horizontal Mounted WDM (Manufacture Discontinued) WDM Modules

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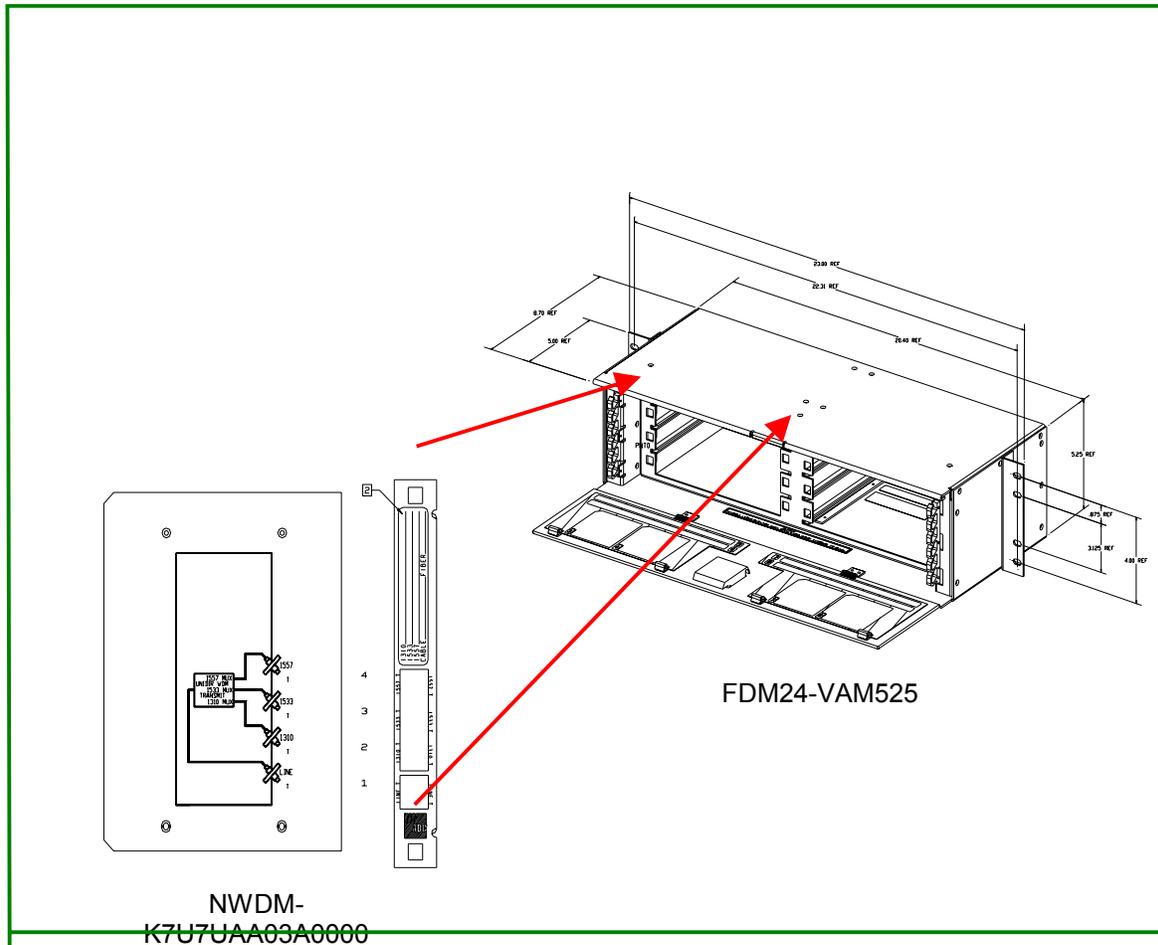
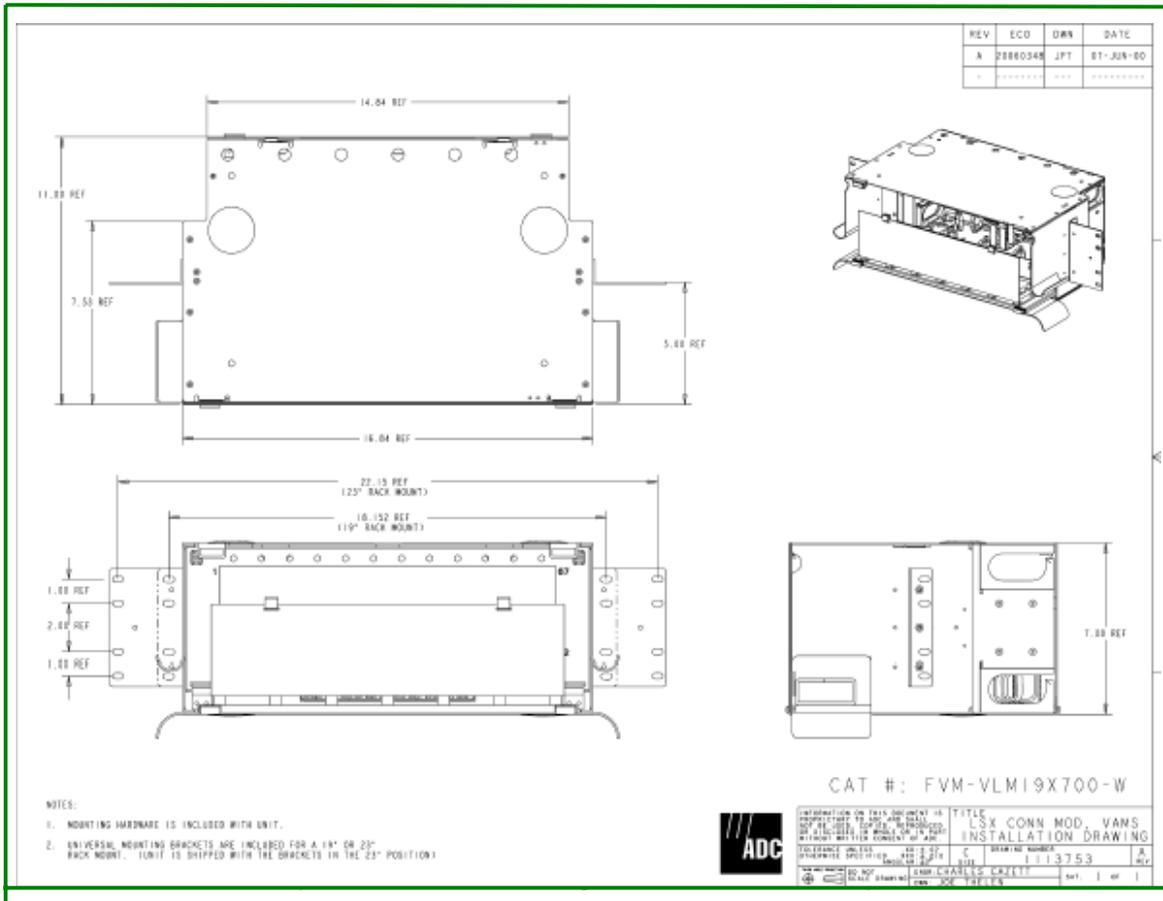


Illustration of the older discontinued SBC-Pacific Bell Module turned on one end and the horizontal shelf

4B. New SBC-13STATE Standard Version

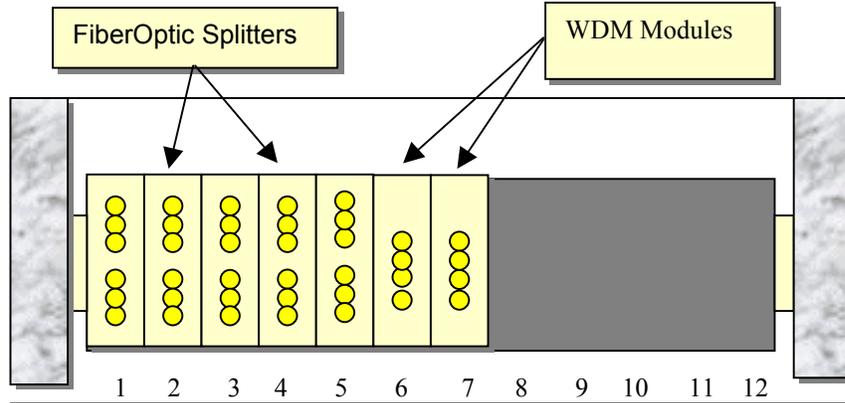
Per SBC PAN 20011069, dated September 2001, the **SBC-13STATE** WDM modules and miscellaneous housings are approved for use. The WDM modules will fit any existing LGX frame Miscellaneous Panel in a standard Fiber Distributing Frame. In addition, Miscellaneous Panels approved for use under the Fiber Optical Splitter PAN may be used as well (PAN 20001026, dated Mar 2000) for WDM Modules. The WDM modules may also be placed within the same panel with FiberOptic Splitter modules, as covered in SBC-002-316-011, *SBC -SingleMode FiberOptic Splitters M&P*, Issue 3, dated April 2001.

In the SBC-Ameritech (AIT) region where the ADC Telecommunications Inc. NGF High Density FDF frame has been deployed, the WDM Modules will be required to be placed within a separate LGX Frame Bay using a transition bay to the NGF FDF Frame. This will require a special arrangement and will necessitate coordination with SBC Services NP&E (Common Systems Staff). Refer to the Contact list in this document.



The **SBC-13STATE** Miscellaneous Panel Standard for use.

The new standard will use the same coupler components, as the older Pacific Bell product but will adapt them to fit the standard vertical mounted miscellaneous FDF shelf for standard use. This Miscellaneous shelf will now permit the placement of both WDM and Optical Splitters in the same shelf providing for up to 12 modules per shelf in a more compact arrangement than the older standard horizontal version. The Miscellaneous shelf may be purchased from either Corning or ADC.



12-slot Miscellaneous Fiber Splitter Panel. As shown in pictorial above, the first 5 slots have Optical Splitters and the last two have WDM coupler modules

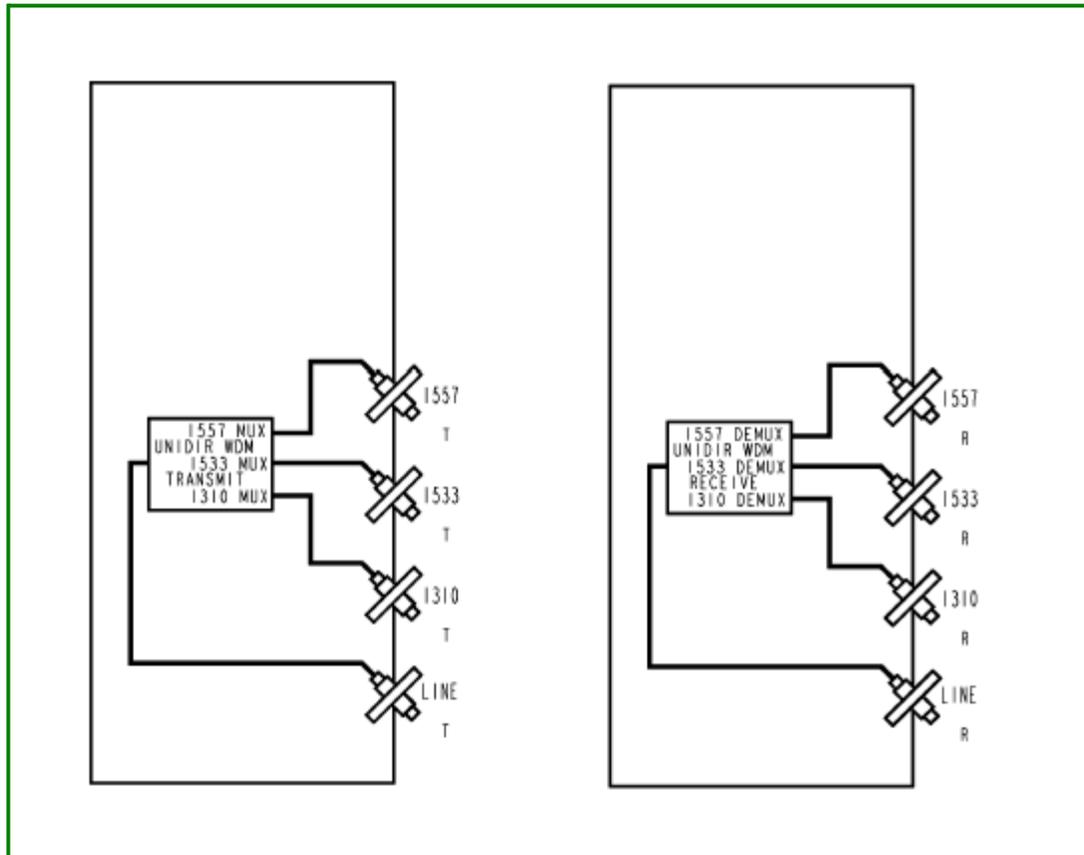
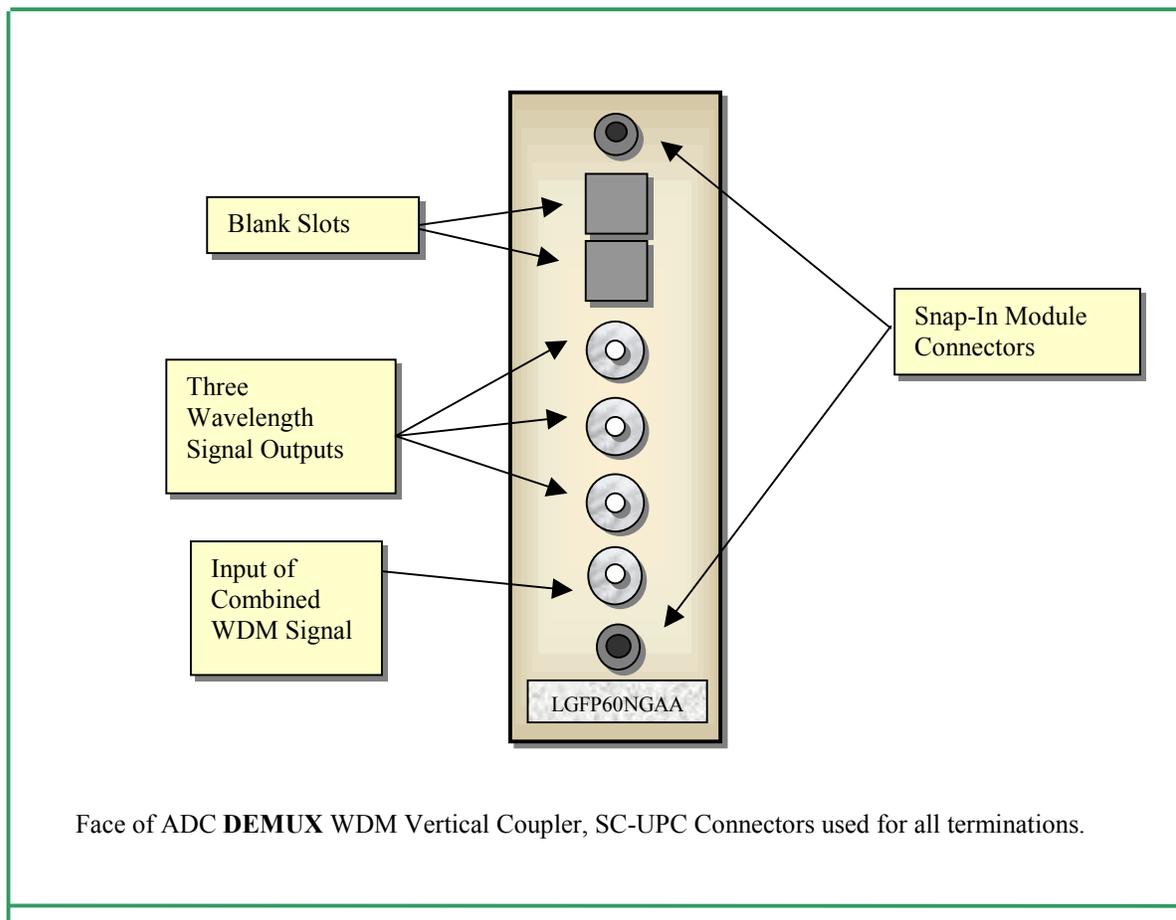
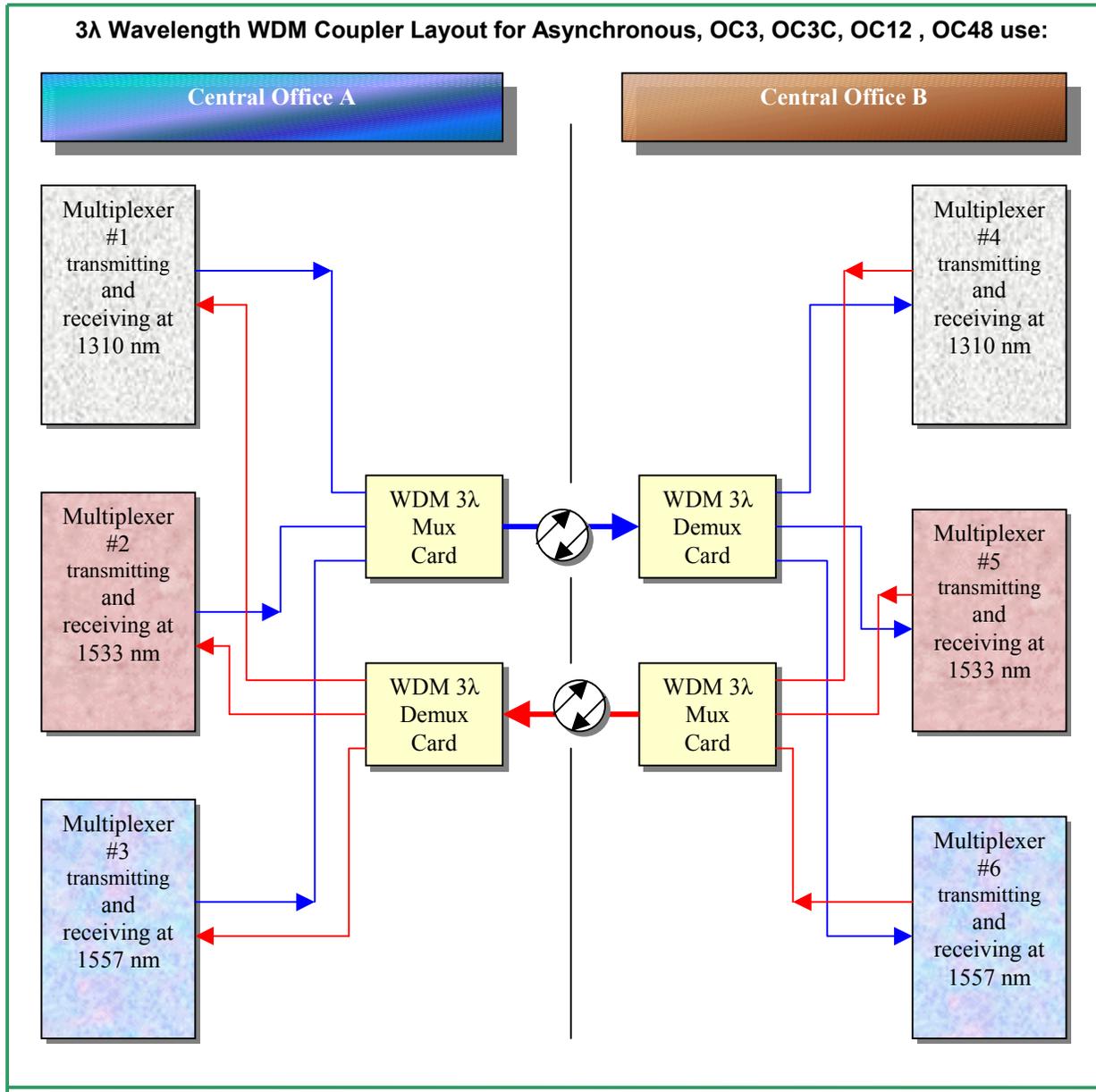


Illustration Drawing of the Mux and Demux WDM Cards

It takes two WDM modules per site, per path route. One WDM card, the MUX card, is the TRANSMIT path from the serving C.O. and sends the three combined signals downstream. The other card, the DEMUX card, supports the RECEIVE path to the serving C.O. and breaks out the three optical signals from the upstream combined WDM signal.



4C. Functional Layout of WDM Couplers



5. Engineering Specifications & Technical Layout for WDM Couplers

5A. Engineering Specifications

SBC-Pacific Bell (and the new **SBC-13STATE** version) currently uses both Nortel and Fujitsu SONET equipment for laser transmitters and receivers. When deploying either product, interference must be avoided between systems (channels) in the 1550 nm window. As a result, the HPTx (Nortel) and the Long Reach (Fujitsu) transmitters will not be used with other systems in the WDM path that use standard reach transmitters. In order to avoid interference between systems in the 1550 nm window (1533 & 1557 nm), it is required that long reach transmitters and standard reach transmitters not be used on the same WDM coupler. This is due to the different power levels, which can cause “hits” on a system already running on one of the 1533/1557-nm ports on the WDM coupler.

Example: Using three (3) OC48 systems on a single WDM span:

	System 1/Channel 1	System 2/Channel 2	System 3/Channel 3
Operating Wavelength (λ)	1310 nm	1533 nm	1557 nm
Transmitting Power	-1.5 dBm	-1.5 dBm	11 dBm
Receiver Sensitivity	-27.5 dBm	-27.2 dBm	-27.2 dBm

A minimum of 8.5 dB of attenuation (pad) is required for either a standard or long reach transmitter to work on this passive coupler. If the total attenuation of the overall WDM span (including couplers on each end) is less than 8.5 dB attenuation, then only standard reach transmitters should be used.

Do not use Long Reach transmitters on channel 1 of the WDM coupler. If Long Reach Transmitters are required, provision Channels 2 and 3 with the Long-Reach transmitters only leaving Channel 1 not used. IMPORTANT: Do not mix, or use, Long Reach and Standard transmitters on the same WDM module.



5A.1. Critical Maximum Solution Assignments Limitations (3 Key Charts)

Optical Carrier Assignment Limitations

WDM Channel	Async Used	OC3 Used	OC3C Used	OC12 Used	OC48 Used
1	Async	OC3	OC3C	OC12	OC48
2	OC48 only				
3	OC48 only				

Optical Carrier Assignment Limitations when One Channel (or More) Needs a Long Reach Transmitter

WDM Channel	Short Reach	Long Reach
1	Do Not Use this Channel	Do Not Use this Channel
2	No	Yes
3	No	Yes

Optical Channel Assignment Limitations when all Channels use Short Reach Transmitters

WDM Channel	Short Reach	Long Reach
1	Yes	No
2	Yes	No
3	Yes	No

Below, Tables 1a, 1b & 1c give product descriptions of the 1310, 1533 and 1557 nm transmitters & receivers to be used with these WDM couplers:

Table 1a: OC48 Standard Reach Transmit Interface Specifications

	Channel 1	Channel 2	Channel 3
	1310 nm	1533 nm	1557 nm
Spectral Characteristics			
Central Wavelength	1310 +/- 10 nm	1533 +/- 3.5 nm	1557 +/- 3.5 nm
Spectral Width	1.0 nm	< 0.45 nm	< 0.45 nm
Side-Mode Suppression Ratio	30 dB	➤ 35 dB	➤ 35 dB
Optical Power			
Launch Power	-1.5 dBm	-1.5 dBm	-1.5 dBm

Table 1b: OC48 High Performance (Long Reach) Transmit Interface Specifications

	Channel 1	Channel 2	Channel 3
	1310 nm	1533 nm	1557 nm
Spectral Characteristics			
Central Wavelength	N/A	1533 +/- 3.5 nm	1557 +/- 3.5 nm
Optical Power			
Power when provisioned at the minimum nominal power of 3 dBm	N/A	3 dBm +/- 1 dB	3 dBm +/- 1 dB
Power when provisioned at the maximum nominal power of 11 dBm	N/A	11 dBm +/- 1 dB	11 dBm +/- 1 dB

Table 1c: OC48 Receive Interface Specifications

	Channel 1	Channel 2	Channel 3
	1310 nm	1553 nm	1557 nm
Spectral Characteristics			
Operating Wavelength	1310 nm window	1550 nm window	1550 nm window
Optical Signal			
Receiver Overload Level	-15.0 dBm	-15.0 dBm	-15.0 dBm
Optical Power			
Quaranteed Receiver Sensitivity	-27.5 dBm	-27.2 dBm	-27.2 dBm

5B. NP&E Design Considerations

5B.1. SBC Drawings

WDM Drawings covered are as follows:

PBSD-ID-1097	SBC-Pacific Bell Drawings for old WDM (Discontinued)	Aug 2001
PBSD-ED-1140	SBC-FDF Engineer Drawings	Aug 2001
PBSD-ID-1140	SBC-FDF Interconnect Drawings	Aug 2001
AM-E-01582-10	SBC-FDF Interconnection Drawing for AIT	Aug 2001
SNE J95145-71	SBC-FDF Equipment Drawing for SNET (12")	Aug 2001
SNE T95145-31	SBC-FDF Interconnection Drawing for SNET (12")	Aug 2001
SNE J95218-71	SBC-FDF Equipment Drawing for SNET (15")	Aug 2001
SNE T95218-31	SBC-FDF Interconnection Drawing for SNET (15")	Aug 2001

These drawings may be found in TAB/db, EDMS/ORION or the NP&E Common Systems Web Site: <http://home.sbc.com/commonsystems/>

5B.2. FiberOptic WDM Cautions

1. First and foremost, it is extremely critical that all technicians working on this WDM technology take proper precautions with regard to laser transmissions that will be concentrated and directed toward the working employee. **Do not expose eyes to this optical transmission and insure that all end caps and/or terminators are properly placed on all WDM ports.**
2. Measure the Power Level of the combined signal (Understand that the power level of each channel is additive to the combined signal.) Most FiberOptic transmissions operate in the negative (-) dB range, but with WDM technologies, especially with long reach transmitters, the potential exists to have a positive (+) dB power level.
3. Expect the actual measured power level loss to be 3 dB when traversing each combined WDM path. Insure that your calculations account for this in your optical loss budget.

Based upon recent Telcordia findings, burnishing or cleaning the ends of the fiber connections must be modified per the table following:

When to Burnish/Clean FiberOptic Terminations

Power Level	Burnish/Clean	Impact
< + 15 dB ¹	Yes	Cleaning will have no effect on the Fiber Termination
+ 15 to + 29 dB	On an exception basis	A thorough evaluation must be made to insure there are no working alternatives and the end must be cleaned in order for the service to work adequately
+ 30 dB or greater	No	This high power level will cause the burnished end to seriously degrade and fail

5C. Accounting Classifications

This product is installed in the Central office Fiber Distributing Frame Miscellaneous Panel. Depending on the application, the accounting classification for the panel and the WDM module will change. When the FiberOptic Cable relief is in support of an interoffice facility, the Accounting Classification is **357C**. When the FiberOptic Cable relief is in support of a local cable feed to a customer/end user/CEV/Remote Hut; the Accounting Classification Code is **257C**.

5D. Installation of the Module & Housing

5D.1. Building Block Process

The EF&I Building Block BB-409, *WDM Installation*, Issue 1, will be used with an effective implementation date of August 20, 2001. The Module and associated housing may either be installed by the Network Operations personnel (with cross-charging to an EF&I authorized TEO) or via a Cluster Vendor or equivalent as a part of a larger existing job. Do not issue as a stand-alone TEO for a Cluster Vendor. The stand-alone TEO applies if the installation is performed by Network Operations personnel only. The total installation time should not exceed one hour at each Central Office location.

¹ Single FiberOptic transmissions are typically in the –10 to –20 dB power level range. With the advent of combined wavelength technologies such as WDM, the combined power level may rise to the positive power level readings, since power levels are additive when optical signals are combined.

5D.2. Work Activities for the EF&I Provider

The **SBC-13STATE** Authorized Vendor will be responsible for installing the WDM Miscellaneous housing in the Fiber Distributing Frame. This will require mounting the panel into the FDF using the four screws into the FDF. The screws will provide the method of grounding. Once, all four screws are properly placed and the housing panel is secure, the WDM modules will be removed from their respective box and slid into the slots, using the left first, in sequence. Each module has a locking tab that will be pushed on the top and bottom and will lock the module into the housing. Close the cover and complete the TEO. No miscellaneous materials are necessary. The housing will be mounted in the upper mounting slot of a FDF FOT bay.

5D.3. WDM Product Material Purchases

The Transport Equipment Engineer (TEE/FEE/DTE) is responsible for provisioning the WDM housing in the Fiber Distribution Frame. The product installed will be the empty chassis, ADC part number FVM-LGX23X1100W, SBC APROMS PID 301034864 using the Building Block covered in this document.

The TIRKS Design Orders will trigger the ordering of the Plug-In Modules through PICS on a plug by location basis. Notice that the two Plug-In Modules are different (Multiplexing vs. Demultiplexing card labeling. For each fiber path between offices or to an end location, both modules will be needed for each Central Office and mirrored distant location.

KIT (Both Multiplexer and Demultiplexer Cards)

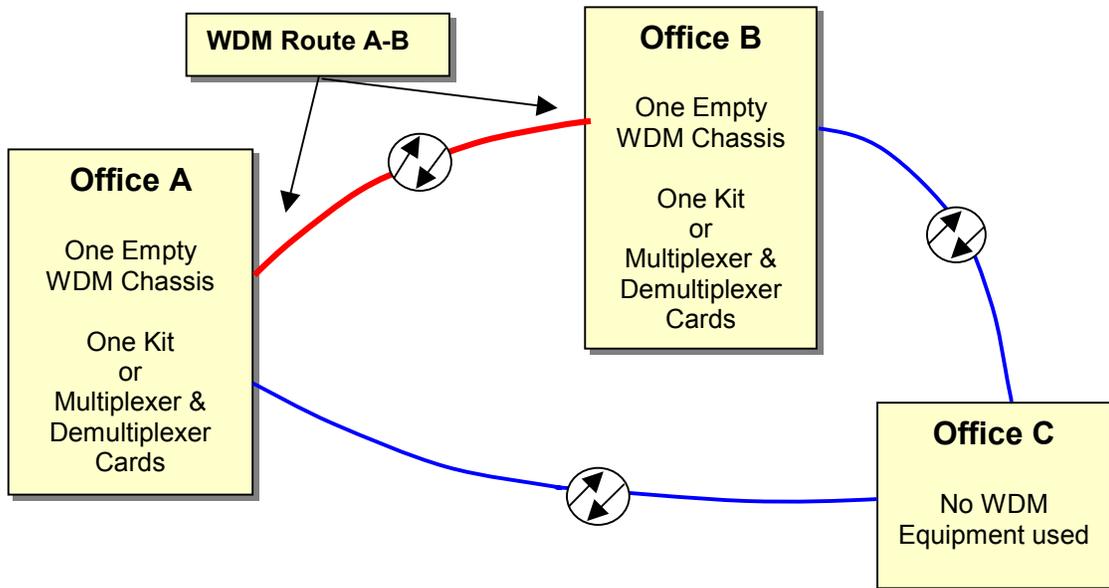
ADC part no. NWDM-KIT-L, SBC APRMS PID 301034872

Or order these two cards:

Multiplexer Card ADC part no. NWDM-27U7UAA03A0000-L, SBC APROMS PID 301034898

Demultiplexer Card ADC part no. NWDM-27U7UAD03A0000-L, SBC APROMS PID 301034880

Therefore, a typical WDM arrangement for a three office Sonet Ring:



6. Operational Considerations

6A. Overview

WDM is a passive device that uses an additive power level. As such, the addition or removal of one of the three inputs to the WDM path will affect the other working optical signals. Every workman activity must take into account the impact of rearrangements and additions. Installations of the WDM Modules and/or Maintenance Panels may be worked under normal timelines. It is strongly recommended that modifications, testing and cross-connect placements be performed during the Maintenance Window (2200-0800 HRS).

The most appropriate benchmark tests for dark fiber are performed using an Optical Time Domain Reflectometer (OTDR) for all readings. This reading should be performed from the same reference test access point and use the same OTDR. The readings need to be recorded on a permanent basis. Test Equipment will need to be checked to insure that the optical power transmitters and receivers are of good quality capable of identifying an optical signal to the –45 dB range for light measurements. Any optical protocol test sets will be product dependent and will need to be purchased in accordance with manufacturer recommendations.

FiberOptic Splitters & Couplers may be used for facility testing for a go, no-go test capability looking toward the light transmission source. This needs to be performed by a preset transmission light source and analyzed by a standard light meter. All light sources placed on the fiber are additive. Measurements when the customer has their traffic, i.e. light source, turned on, will show the loss referenced to the power of the customer's laser. If at any point the ILEC adds another light source upstream, verify that the transmission signal strength (power) is extremely low (below 30 dB) and the wavelength is different from the customer transmission wavelength. For services that are provided by SBC, it is recommended that a power reading be taken both *before* a normal light source is placed and *after* with the normal expected transmission power. Record both readings. Thereafter, the FiberOptic Splitter/Couplers can permit the user the ability to measure the intrusive readings with an open circuit (no light) and with the expected measured loss with the normal power reading. If SBC does not control the light transmission source and receiver inputs/outputs to the WDM paths, the ongoing measurements will vary based upon the customer strength inputs that can negate the ability to use the WDM product. Resultantly, the use of WDM technology shall only be used when the light levels are known quantities and are within established parameters in relation to each respective channel within the WDM light path.

6B. LFO Test & Turnup Crew Responsibilities

6B.1. LFO Installation

Prior to the placement of any WDM products, the Interoffice Fiber should be tested to determine if it will be suitable for use with this equipment. Benchmark testing needs to be performed.

Installation will be done by the normal "test and turn-up crew" in each region. Upon initial installation of the WDM, readings will be taken with an OTDR (Optical Time Domain Reflectometer) test set and recorded. This information will be kept on a sheet in a plastic sleeve, attached to the bay in the Central Office. Properly clean all exterior FiberOptic contact points using established cleaning procedures. **NOTE:** OTDR readings should be taken at the 1550 nm transmission level.

When circuits are installed on the WDM, readings should be taken with an OTDR test set and noted on the sheet in the plastic sleeve, attached to the bay in the Central Office and noted on the OSSCN screen for each circuit in WFA/C.



CAUTION: A WDM system may not be filled to capacity (3 circuits) at initial installation. If another circuit is added at a later date, the existing circuit(s) must be pulled down in order to connect the new circuit(s). This should be done during the standard maintenance window.

6B.2. LFO Maintenance

Maintenance will be performed by the LFO-IN/CO, business as usual, as any other piece of fiber. Fiber and fiber cross-connect maintenance will be performed as required.

NOTE: The WDM will not be alarmed.

The WDM will be installed on a temporary basis for no more than 12 months from the point in time when they have been entered into the TIRKS records keeping system.

6C. Training

Formalized training will be made available through the Regional Training Centers. The WDM product will generally be integrated into existing FiberOptic training classes as follows:

Region	Class Number	Course	Location(s)	Beginning Cycle
Ameritech	NI028	Fiber Splicing	Columbus, OH	4 th QTR, 2001
Ameritech	NT043	SONET-Fujitsu	Columbus, OH	4 th QTR, 2001
Ameritech	NT044	SONET-Fujitsu	Columbus, OH	4 th QTR, 2001
Pacific Bell/ Nevada Bell	50173023	NEC 560 Fiber Provisioning & Maintenance (Nortel/Fujitsu)	Sacramento, CA Tustin, CA Hayward, CA Gardenia, CA	4 th QTR, 2001
SNET	PE400	FiberOptic Design	New Haven, CT	Oct 2001
SNET	PT590	Fiber Ribbon Splicing	New Haven, CT	Oct 2001
SWBT	112	FiberOptics	Irving (Dallas), TX	Nov 2001

6D. Special Services Test Center (SSTC) Responsibilities

The SSTC will be the Overall Control Office (OCO) and Maintenance Control Office (MCO) for the WDM product. The following provisioning and maintenance responsibilities are general guidelines. Due to regional differences, some tasks may overlap between groups or be performed by a different group.

6D.1. Provisioning

- After identifying that the order is a WDM order, the SSTC will determine which work groups (NOC, Central Offices, and/or DOG/SSI&M groups or equivalent) will need an appointment to be made to provision/test the WDM circuit.
- The SSTC will make the appointments in WFA/C, and, if required, call the appropriate work groups (DOG, SSI&M etc.) for appointments for the outside field technicians. The technicians will call the test results to the SSTC.
- The SSTC will be responsible for recording local contact names and numbers and WDM test results on the WFA/C OSSCN screen. These test results will be maintained in WFA/C as reference for any future trouble reports or maintenance activity.
- For additional information, refer to the appropriate sections of this M&P.

6D.2. Testing

Follow established guidelines for optical/fiber services. Also reference sections 6 and 7 of this M&P.

6D.3. Billing

Follow established guidelines for optical/fiber services.

6D.4. Maintenance

- The SSTC is responsible for the overall tracking and coordination of the trouble analysis and repair, as well as performing a hand-off of the WFAC trouble ticket, if a dispatch is required.
- The SSTC technician is responsible for recording all activity on the OSSLOG of the WFA/C trouble report.
- The SSTC technician will hand-off the trouble ticket to the NOC for NMA evaluation or further sectionalization.
- For additional information, refer to the appropriate sections of this M&P.

NOTE: If NMA is available to the SSTC technician, the status of the optical ring should be checked.

6D.5. Status and Escalation

Follow established guidelines for optical/fiber services.

6D.6. Testing

Follow established guidelines for optical/fiber services. Also reference sections 6 and 7 of this M&P.

6D.7. Billing

Follow established guidelines for optical/fiber services.

7. Procurement

7A. SBC Product Identification Numbers (PIDs)

The new "Vertical" ADC 3 Channel WDM Product PID's are as follows:

SUPPLIER VP#	CONTRACT#	FOB POINT	PRODUCT LINE CODE	NEW PID	ITEM NAME (CHAR, NOUN 1ST) (40)	PRICE	HAZARD	CLEI
FVM-LGX23X1100W	PO5063	OR	17121	301034864	Empty Chassis, holds up to 12 VAM modules: 7" Chassis	\$295.00	N	VLMA990CRA
NWDM-KIT-L	PO5063	OR	17121	301034872	Kit contains (1) multiplexing WDM (NWDM-27U7UAA03A0000-L) AND (1) demultiplexing WDM (NWDM-27U7UAD03A0000-L)	\$2,538.00	N	Codes assigned
NWDM-27U7UAA03A0000-L	PO5063	OR	17121	301034898	Module Unidirectional Multiplexer, wavelength: 1310/1533/1557nm; very high isolation; all front SC adapter ports	\$1,269.00	N	LGFP60MGAA
NWDM-27U7UAD03A0000-L	PO5063	OR	17121	301034880	Module Unidirectional Demultiplexer wavelength: 1310/1533/1557nm; very high isolation; all front SC adapter ports	\$1,269.00	N	LGFP60NGAA

7B. PLUG-IN Management

PICS will maintain a Stockage Level of 3-each of the following HECI at each of the four PICS Stock Centers: LGFP60MGAA & LGFP60NGAA. PICS will not stock more than 3 units of each type at any time. Replenishment will occur upon exhaust at the respective PICS Center.

The Empty Chassis identified in the above table will not be stocked in PICS and must be ordered separately by the Transport Equipment Engineer (TEE/FEE/DTE).

PICS will use the Configuration Code WDM-TU for all four PICS regions. This can be found in the SONET section of the Configuration Tables. Applicable HECIs will be listed on the order in order for E1 Inventories to properly account for the Plug-Ins assigned to that panel. Each card must be assigned to the respective Office CLLI. Do not order the Plugs as a part of the Panel installation.

Due to the durability of this passive product, there will not be any Maintenance Spare Plug-In WDM units at any Central Office provided.

At such time the WDM span is turned down and restored to normal service, the Plug-In units will be returned to PICS and the Empty Chassis can continue to be used as a Miscellaneous Panel for other services and purposes covered in Fiber Distribution Frame Practices and M&Ps (see Reference Section of this document).

7C. Manufacturer Contact Information

Todd Duberstein
Product Manager
ADC Fiber Optic Division
Tel: 952.233.9116
Fax: 952.233.9088
todd_duberstein@adc.com

Todd (above) is the Product Manager & Technical expert on these products.
Kristen (below) is the Customer Service representative and is the contact for ordering, tracking, deliveries, etc.

KRISTIN DORMAN
ADC TELECOMMUNICATIONS
Associate Account Specialist
Southwestern Bell Telephone
phone 1-800-366-3891, ext 3015
FAX 612-946-3237
E-MAIL kristin_dorman@adc.com <mailto:kristin_dorman@adc.com>

7D. Product Testing and NEBS Standards

The 3λ WDM Product line has been tested previously by SBC-Pacific Bell and has been retested by ADC Telecommunications to meet SingleMode Technical Specifications covered in PAN 20011069, *SBC Standard on WDM Couplers*, dated September 2001.

The 3λ WDM product manufactured by ADC Telecommunications has been reviewed by SBC Services, Network Planning & Engineering (Common Systems). It has been determined this product is in conformance to TP 76200MP (NEBS) Ancillary Requirements, Log Number 858, dated July 17, 2001.

7E. Alternate Miscellaneous Panel Ordering

The Miscellaneous Panel used for PAN 20011069, FiberOptic Splitters and Associated Housings, dated March 2000 may also be used for the WDM modules. Both the WDM and the FiberOptic Splitters are designed to fit within the Miscellaneous Housing, provided by either Corning Cable Systems listed below or through this PAN with ADC Telecommunications Inc.

FDI Splitter Housing, 12 Slots	357C/257C \$223.04	LGXYP2RA 300029766/ 9506568	LDC-CMH-072 LDC (Vertical) Optical Splitter Housing; Rack Mount
-----------------------------------	-----------------------	-----------------------------------	---

The distributor for the Corning Cable Systems series of FiberOptic Splitters and Associated Housings products (where all orders will be placed) is listed as follows:

American Communications Supply (ACS)
Vendor Number: 321102
Contract Number: C005249
Address Code: 07879

The Primary Point of Contact for ACS is Rick Putrah (800) 925-4764.

The manufacturer is listed below:

Corning Cable Systems (formerly Siecor)
PO Box 489
Hickory, North Carolina 38603-0489
(800) SIECOR1
(800) 743-2671
FAX (828) 325-5060
<http://www.corning.com>

The Siecor Marketing Representative is Liz Guevara at (760) 729-4211, E-mail:
Elizabeth.Guevara@corning.com

8. Circuit Provisioning Administration

8A. TIRKS Overview

TIRKS will order, manage and assign the WDM Modules using the appropriate HECIG, Function Codes and Channel Codes. The intent is to have the product ordered through PICS and managed in the same way that a D4 bank would have plugs and circuits assigned. The product will be assigned on an **EXCEPTION BASIS** and will be earmarked for removal one year after deployment.

Critical dates will be set through negotiation with Network Operations.

TIRKS Tier 1 Support: Local CPC SME
TIRKS Tier 2 Support TTRC: (210) 360-5405
Methods Support: Joe Schaeffer (210) 886-4619

8B. Mounting Configuration & Unit Numbering

Mounting Configuration and Unit Numbering:

1. Each twelve (12) slot mounting supports six (6) WDM systems.
2. The shelf slots are stenciled 1 thru 12. WDM applications require two slots, one transmit and one receive. The unit numbering on the E1 build models assumes the slots will be used in pairs. 1 with 2, 3 with 4 ... 11 with 12. Transmit will be in odd slots (1,3,5,7,9,11). Receive will be even slots (2,4,6,8,10,12)
3. Each shelf installed in a relay rack will be assigned a numerical designation (01 thru 13) to designate the panel position. This designation will be part of the relay rack designation.

Example: 01 101. .01 - 09

Floor aisle bay panel

8C. Inventory/Assignment

A 3 channel 'OMC' F1 record will be created to administer the WDM system. The nature of the technology determines the wavelengths assigned to each channel.

Channel one (1) supports 1310nm optical signals (Async, OC03, OC12 & OC48)
Channel two (2) supports 1533 nm optical signals (OC48 only)
Channel three (3) supports 1557nm optical signals (OC48 only)

The F1 inventory will be built with the Channel Use field populated on each channel. ***This value will be a required modifier on the Planning Design to insure that the correct channel is assigned based on the rules above.***

8D. Building the Inventory

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Only one model has been created to support the E1 inventory build. **VLM1XV0D** model 1 builds the inventory to support 6 OMC 3 channel systems.

Exhibit 1

```

EQUIPMENT HIERARCHY MODEL INVENTORY (EHMINV) /FOR
COMMAND: BUILD PAGE 001 07/20/01 15:10:57
EQP CD: VLM1VX0D MODEL#: 1 LTERM: PARTIAL BUILD: PRINT ALL:
***** GLOBAL MODEL DATA *****
LOCATION: trngdbaa RELAY RACK: 01100.03-9 INV AUTH CODE: tt
ASGN AUTH: tt CTL LOC: MNTC RESP: SW/FW: SCID:
IE STAT: pa IE ORD#: DATE: INV CTL:
NOTE:
USER DATA: AUTH NBR: PICS LOC: LEAVE PLUGS:
/----- PENDING ORDER DATA -----//----- OWNERSHIP DATA -----/
ORDER NBR ITEM DATE TYPE CPY/PCT:
EQP ORD: nx12345 001 07 21 01 a MSC NBR:
SUPL: LCF NBR: LEASE NBR:

***** CHANGE MODEL DATA *****
MODEL DATA CHANGE UNITS ---PARENT MODEL DATA---
A LV EQUIP CODE FROM TO FROM TO PARENT CD FROM TO RELAY RACK
01 VLM1VX0DRA 1 1
02 VLM1VXKDRA 01-02 01-02 VLM1VX0DRA 1 1
02 VLM1VXKDRA 03-04 03-04 VLM1VX0DRA 1 1
02 VLM1VXKDRA 05-06 05-06 VLM1VX0DRA 1 1
02 VLM1VXKDRA 07-08 07-08 VLM1VX0DRA 1 1
02 VLM1VXKDRA 09-10 09-10 VLM1VX0DRA 1 1
EQP052I FIND COMPLETED SUCCESSFULLY CONTINUE NEXT PAGE
    
```

8E. ADC WDM Channel Bank & Function Codes

ADC Mounting	Channel Bank Code	Function Code
VLMAY50C 8 slot horizontal mounting*	AD34	WDMP2NN
VLM1VXKDRA 12 vertical mounting	WD2C	WDMP4NN

* Embedded inventory in California

8F. TIRKS Documents

8F.1. Frame Data

```
07/20/01 15:16:38      EQUIPMENT INVENTORY FRAME DATA(EFRM)      /FOR
LOCATION TRNGDBAA      EQUIP CODE VLM1VXKDRA      RELAY RACK 01100.03-9 PROP
FROM 01-02      TO 01-02      INV AUTH CODE TT EDIT LEADS Y/N
ORDER NBR  ITEM  DATE  TYPE D/R /---FRAME TERMINATION RANGE TYPE  ---/
EQP ORD
SUPL
IN EFFECT FRAME TERMINATIONS      PENDING CHANGE FRAME TERMINATIONS
A TY FR ADDR1 ADDR2 ADDR3 ADDR4 LEADS  A TY FR ADDR1 ADDR2 ADDR3 ADDR4 LEADS
T G1 03  9    1    NYNNNNN      "line side"
T G1 03  9    2    NYNNNNN

    ↑           ↑           ↑
Addr 1 bay   Addr 2 panel   Addr 3 "terminal"

EQP000I FIND COMPLETED
```

8F.2. FEPS Work for OMC System (Planning Design)

```
COMMAND                PLANNING DESIGN (FEDSN)                /FOR:
SI      07/20/01  15:25:50                PAGE 001 OF 001
LCTN A TRNGDBAA   LCTN Z TRNGDBBB   DSNO X1T0111 PAA TTTT OCT/TRC OMC-3
PDAC DAA2VM6     USE FROM           TO           COST $           SUBPATH           OR 0
SOURCE ONLINE UPDATE 03302001   NTKW CODE           UPDATED BY       D/A   #ICP 00
BLDG A TRNGDBAA   BLDG Z TRNGDBBB   HDR TYPE 8 TO 8     PROT N   EDSX N TM A
DLE A/Z T T           SUBPATH/EQUIP   FAC TYPE/   GEN/   EQ/FACUSE CHANUSE
M   SEQ  LOCATION  MW/DT  /NETWORK CODE   EDSX LOC  MPL  /D&C IND  /NODE  TP
      005 TRNGDBAA
      010           4           CF0000           LG-LGSS
      015 TRNGDBBB
                                         CZ

FEP000I FIND COMPLETED
```

8F.3. SCS Record

```

COMMAND:          FEPS/SCS  -- CARRIER RECORD ( SCCXR )          /FOR:
LCTN A/          LCTN Z/
REL NTWK A      REL NTWK Z  SYS#   FACTYP  DUE DATE  R  ACT  CXRTYP  PATH 15:23:26
TRNGDBAA       TRNGDBBB   700    OMC     08152001  FA  OMC-3  MSGS:
                                     SOURCE: ONLINE
I  JAC          ( SELECTION TNC TRACKING#          PDAC      ) P  J  LK  C  CMPL  PROT
  JXA2JE5 ( ONLY:                               )      *      N      N
CUST
END  BANK A    AT  R  USE  EQP CODE A          BANK Z  AT  R  USE  EQP CODE Z
   WD2C          N                               WD2C          N
OV
FL  PDAC      PAA  SUBPATH  TM  A  Z  USE PD  A  Z  CODE  NTWK  ADD/  DSN
Y  DAA2VM6   TTTT  X00001  A          Y          N      N  N
                                     -- CHAN --  -- SLOT --  SVC  ORD  F1
#CHAN #SLOT  FROM TO          FROM TO          CLO#          CAC          IND  STAT  INV
0003  0003
TIMING: PRI/          STRATUM  DED  SG          TRANS  DLC/  -NOTE-  EVT
          SEC  DT  A  Z  RTE  LK  UMB  DV  DT  CRR  DDS  RATE  INA  F1  GOC  TBL
                                     BI  N  N
                                     DUE DATE  ASGT
          COORD# (1)  COORD# (2)  RESERV/PROJ#          LOCK  NBR  RESP  USER
C          C          R  WDM          D          TT
NOTES:
SC10000 FIND COMPLETED
    
```

8F.4. Circuit Design (CD)

```

COMMAND          CIRCUIT DETAILS          /FOR
    
```

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CKT	C	700	/OMC	/TRNGDBAA	/TRNGDBBB	A	Z						
CLO	TTC001493001	DV	ACT	A	IND	PRQ	TSP	MSC	N	MCO			
CAC	CTB3MZ7	CUST					PULS	MW	EML	OBJ	PG	01 OF 02	
M	SEQ	A	LOCATION	SV	EQPT/FAC	RR/TYPE	UNIT	A	TLP	Z	SBDV/MISC	TP	
002	E	TRNGDBAA				WD2C						NB	
004		TRNGDBAA				WDMP4NN						F#	
006	A	TRNGDBAA			VLM1VXKD	01100.03-9	01-02				FG1/03/9	/01	EM
008		TRNGDBAA									FG1/03/9	/02	EX
010	A	TRNGDBAA			LGFP60MG	F							P
012	A	TRNGDBAA			LGFP60NG	F							P
014		TRNGDBAA											CA
016	A		AZ	LG01	LG-LGSS		00001						C#
018											WL=0825	DB19.1	CX
020				A-TERM			1:2				FG1/01/P2	/0A0	CX
022				Z-TERM			1:2				F01/02/P2	/0A0	CX
024						01100	.01				FTA=LGX		CX
026						03317	.02				FTZ=FTE		CX
028						SW	0006.7				TTTT0006.7	XA	D#
030	A		ZA	LG01	LG-LGSS		00002				1:0		C#
032											WL=0825	DB19.1	CX
034				A-TERM			1:2				FG1/01/P2	/2	CX
036				Z-TERM			1:2				F01/02/P2	/2	CX
038						01100	.01				FTA=LGX		CX
040						03317	.02				FTZ=FTE		CX
042						SW	0006.7				TTTT0006.7	XA	D#
044		TRNGDBBB											CZ
046		TRNGDBBB				WDMP4NN							F#
048	A	TRNGDBBB			VLM1VXKD	01101.09-9	01-02				FDf/09/9	/01	EM
050		TRNGDBBB									FDf/09/9	/02	EX
052	A	TRNGDBBB			LGFP60MG	F							P
054	A	TRNGDBBB			LGFP60NG	F							P
056	E	TRNGDBBB				WD2C							NB

WDM
MODULES

8F.5. Partial Display of WORD Document

SYS	700	/OMC	/TRNGDBAA	/TRNGDBBB	TMG					
ORD	TTC001493		-001	SUPP	ACTN	A	CAC	CTB3MZ7	MCO	
N/*	LOCN, EQPT	AND	FAC	FRAME	ID	UNIT	DT	Z-A	A-Z	MISC
	TRNGDBAA									
				WD2C						
					WDMP4NN					
A	VLM1VXKD				01100.03-9	01-02				
A	LGFP60MG				F					
A	LGFP60NG				F					
	FDf				01100/FG1/03/9/01					
	FDf				01100/FG1/03/9/02					
	TRNGDBAA									
	FDf				01100 .01/FG1/01/P2/1			AZ		
	FDf				01100 .01/FG1/01/P2/2			ZA		
A	LG01				LG-LGSS	00001		AZ		
									WL=0825	DB=19.1
									1:0	
									TTTT0006.7	XA
A	LG01				LG-LGSS	00002		ZA		
									WL=0825	DB=19.1
									1:0	
									TTTT0006.7	XA

The mounting is located in the FDF. The frame termination information matches the physical location.

8F.6. Chan Use Code

As mentioned earlier, each of the three channels will support **specific wavelengths**. The transmitter of the “riding” system must match the wavelength supported by the OMC channel to which it is assigned. A value populated in the *Chan Use* field of the F1 inventory will be used to drive assignments to correct OMC channels.

Chan Use will be required on the SCS records to assure that the wavelength of the transmitter and the channels assigned are compatible.

The Chan Use code is a 3-character field that can be UPDATED on the CXRD format:

```
07/20/01 16:11:03 CARRIER-DLC ASSOCIATION SCREEN (CXRD) /FOR
TERM A TRNGDBAA TERM Z TRNGDBBB FAC DES 700 FAC TYPE OMC
CAC CTB3MZ7 CLO TTC001493 001 DUE DATE 04 15 01 INV STAT PA MODE S
CXR TYPE OMC-3 DDS N F/A F DLC/INA GA LDNG LTH-KF RESIS LOSS
FROM/TO CHAN 00001 00003 RANGE
LOCATION TRNGDBAA LOOP ID FROM/TO PAIR
FDI ADDR FRAMA E FRAMZ E
MAKEUP
```


CHAN	SLOT	ALIAS	USE	RSTN	PAIR1	PAIR2	FMT	FRAME	ADDR1	ADDR2	ADDR3	ADDR4
00001	00001	1	310				T	G1	03	9	1	
00002	00002	2	533				T	G1	03	9	2	
00003	00003	3	557				T	G1	03	9	3	

8F.7. Assigning “riders” to the WDM System

The nature of passive wave division multiplexing requires that the wavelength of the “riding” systems transmitter be matched to the wavelength passed by the channel to which it is assigned on the OMC system. This requirement will necessitate the use of a **CHAN USE** and a **BANK ATTRIBUTE** code. The CHAN USE code will drive the OC48 high-speed link design to a specific channel on the OMC system. The Attribute code will be used by PRO/CDS to post to the appropriate Function code based on the channel assigned.

The following example establishes a High Speed Link of a Fujitsu OC48 on a channel of the WDM system between TRNGDBAA and TRNGDBBB. **Channel availability must be checked prior to the creation of the SCS records associated with this circuit.** In this case, channel 2, which supports 1533nm, is available for assignment. **The requirement to match the channel to the transmitter will necessitate special attention by the Planning and the Design organizations.** This is especially true in those Areas where the transmitter plug-in is ordered via the WORD document.

Planning Design to assign OC48 High Speed Link Design to Channel 2 of OMC WDM System:

COMMAND		PLANNING DESIGN (FEDSN)				/FOR:	
SI	07/20/01 16:21:00					PAGE 001 OF 001	
LCTN A	TRNGDBAA	LCTN Z	TRNGDBBB	DSNO	X9T0040	PAA	TTTT OCT/TRC OC48
PDAC	DAA2VN8	USE FROM	TO	COST \$	SUBPATH XT0000 OR 0		
SOURCE ONLINE UPDATE 07202001		NTWK CODE	OSONET	UPDATED BY	D/A	#ICP	00
BLDG A	TRNGDBAA	BLDG Z	TRNGDBBB	HDR TYPE	8 TO 8	PROT N	EDSX N TM O
DLE A/Z	T T	SUBPATH/EQUIP		FAC TYPE/	GEN/	EQ/FACUSE	CHANUSE
M	SEQ	LOCATION	MW/DT	/NETWORK	CODE	EDSX LOC	MPL /D&C IND /NODE TP
	005	TRNGDBAA					XA
	010		B	X00001	OMC-3		533 XS
	015	TRNGDBBB					XZ

A channel attribute code on the SCS record will be used by PRO/CDS to select the Function code : (10-1310nm 33-1533nm 57-1557nm)

COMMAND:		FEPS/SCS -- CARRIER RECORD (SCCXR)				/FOR:	
LCTN A/	LCTN Z/					07/20/01	
REL NTWK A	REL NTWK Z	SYS#	FACTYP	DUE DATE	R	ACT	CXRTYP PATH 16:50:04
TRNGDBAA	TRNGDBBB	301	OC48	03151999		FA	OC48 MSGS:
						SOURCE: ONLINE	
I	JAC	(SELECTION	TNC	TRACKING#	PDAC) P	J LK C Cmpl PROT
	JXA2HA8	(ONLY:	L	TTC001142001)	* N N
CUST		EQP				EQP	
END	BANK A	AT R	USE	EQP CODE A	BANK Z	AT R	USE EQP CODE Z
	FJ24AE	33	N		FJ24AW	33	N
OV				-ALLC-	FAC VAL	-FRAME-	NTWK ADD/ DSN
FL	PDAC	PAA	SUBPATH	TM A Z	USE PD	A Z	CODE DISC R REUSE
N	DAA2VN8	TTTT	XT0000	O	Y		N90193 N N N
		-- CHAN --		-- SLOT --			
#CHAN	#SLOT	FROM	TO	FROM	TO	CLO#	CAC IND STAT INV
0001	0001					L TTC001142001	CTB3KN2 P Y
TIMING:	PRI/	STRATUM	DED	SG	TRANS		DLC/ -NOTE- EVT
	SEC	DT A Z	RTE	LK UMB DV	DT	CRR	DDS RATE INA F1 GOC TBL
					BI	N	N Y E *??*
					DUE DATE		ASGT
	COORD# (1)	COORD# (2)	RESERV/PROJ#		LOCK NBR		RESP USER
C	C		R		D		TT
NOTES:							
SC10000 FIND COMPLETED							

8F.8. CD and WORD Document Exhibits

CD after FEPDSN:

COMMAND		CIRCUIT DETAILS										/FOR	
CKT	C 301	/OC48	/TRNGDBAA	/TRNGDBBB								A	Z
CLO	TTC001142001	DV	ACT A	IND	PRQ	TSP	MSC N	MCO					
CAC	CTB3KN2	CUST				PULS	MW	B	EML	OBJ			G 01 OF 01
M SEQ	A	LOCATION	SV	EQPT/FAC	RR/TYPE	UNIT	A	TLP	Z	SBDV/MISC			TP
	002	E TRNGDBAA			FJ24AE	33							NB
	004	TRNGDBAA	XA										
A	006			X00001	/OMC-3								XS
	008												XX
	010	TRNGDBBB											XZ
	012	E TRNGDBBB			FJ24AW	33							NB

Bank Attribute Code → (points to FJ24AE 33)
Channel Use Code → (points to CHAN USE=533)

Posted CD:

COMMAND		CIRCUIT DETAILS										/FOR	
CKT	C 301	/OC48	/TRNGDBAA	/TRNGDBBB								A	Z
CLO	TTC001142001	DV	ACT A	IND	PRQ	TSP	MSC N	MCO					
CAC	CTB3KN2	CUST				PULS	MW	B	EML	OBJ			PG 01 OF 03
M SEQ	A	LOCATION	SV	EQPT/FAC	RR/TYPE	UNIT	A	TLP	Z	SBDV/MISC			TP
	002	E TRNGDBAA			FJ24AW	33							NB
	004	TRNGDBAA											EH
	006	TRNGDBAA								TTE002988001			EO
	008	TRNGDBAA			FS3D4LNA5								F#
	010	A TRNGDBAA								F01/06/07 /38			EM
	012	TRNGDBAA								F01/06/07 /39			EX
	014	TRNGDBAA								FZK/HS1 /HT2H			EX
	016	TRNGDBAA	01										EX
	018	TRNGDBAA		SD=FJTU-	FLM2400								EX
	020	TRNGDBAA		\$TX=FROM	FOT TO MU X;RX=								EX
	022	TRNGDBAA		FROM DEM	UX TO FOT								EX
	024	A TRNGDBAA			SN48AEAA	F							P
	026	TRNGDBAA			\$1533.47	; TX=FROM FOT T							PX
	028	TRNGDBAA			O MUX								PX
	030	A TRNGDBAA			SNPQBY75	F							P
	032	A TRNGDBAA			SNPQAWD5	WS							P
	034	TRNGDBAA			WDMP4NN								XF
	036	TRNGDBAA		VLM1VXKD	01100.03-9	01-02				FG1/03/9 /1			XM
CLR027I	POST COMPLETED -JEOPARDY ISSUED												

COMMAND		CIRCUIT DETAILS										/FOR	
CKT	C 301	/OC48	/TRNGDBAA	/TRNGDBBB								A	Z
CLO	TTC001142001	DV	ACT A	IND	PRQ	TSP	MSC N	MCO					
CAC	CTB3KN2	CUST				PULS	MW	B	EML	OBJ			PG 02 OF 03
M SEQ	A	LOCATION	SV	EQPT/FAC	RR/TYPE	UNIT	A	TLP	Z	SBDV/MISC			TP
	038	TRNGDBAA								FG1/03/9 /2			EX
	040	TRNGDBAA		WD2C									XA
	042	A		X4 700	OMC	2							XX
	044									OWNER=B-BB			XX
	046									CHAN USE=533			XX
	048				SW	0006.7				TTTT0006.7	XA		D#
	050	TRNGDBBB		WD2C									XZ
	052	TRNGDBBB			WDMP4NN								XF
	054	TRNGDBBB		VLM1VXKD	01100.03-9	01-02							XM
	056	TRNGDBBB			SNMSRM02	01192.48-1	HS1						EH
	058	TRNGDBBB								TTE004114001			EO
	060	TRNGDBBB			FS3D4HNA5								F#
	062	A TRNGDBBB			SNMSRN02	01192.48-1	2E						EM
	064	TRNGDBBB	02										EX
	066	TRNGDBBB		SD=FJTU-	FLM2400								EX
	068	TRNGDBBB		\$TX=FROM	FOT TO MU X;RX=								EX
	070	TRNGDBBB		FROM DEM	UX TO FOT								EX
	072	A TRNGDBBB			SN48AEAA	F							P
CLR026I	FORWARD COMPLETED												

WORD Document:

```

SYS 301 /OC48 /TRNGDBAA /TRNGDBBB TMG
ORD TTC001142 -001 SUPP A ACTN A CAC CTB3KN2 MCO
N/*LOCN,EQPT AND FAC FRAME ID UNIT DT Z-A A-Z MISC
SYS SCID=N90193
TRNGDBAA
      FJ24AE 33
      FS3D4ENA5
A SNMSRN02 01101.01 E
      $TX=FROM FOT TO MIX/RX=
      FROM DEMUX TO FOT
A SN48AEAA F
      1533.47; TX=FROM FOT T
      O MUX
A SNPQBY75 F
A SNPQAWD5 WS
      LGX 01100/FG1/04/1/1
      LGX 01100/FG1/04/1/2
      WDM4NN
      VLM1VXKD 01100.03-9 01-02
      FG1/03/9/01
      FG1/03/9/02
WD2C
R 0724 CO SWTT DSGNR JPS/210-886-4619 ISS 001/ - - PG C001-002
    
```

```

SYS 301 /OC48 /TRNGDBAA /TRNGDBBB TMG
ORD TTC001142 -001 SUPP A ACTN A CAC CTB3KN2 MCO
N/*LOCN,EQPT AND FAC FRAME ID UNIT DT Z-A A-Z MISC
TRNGDBAA
A 700 OMC
      2
      B
      7 XA
TRNGDBBB
WD2C
      WDM4NN
      VLM1VXKD 01101.09-9 01-02
      LGX 01101/FDF/09/9/2
      FJ24AW 33
R 0724 CO SWTT DSGNR JPS/210-886-4619 ISS 001 / - - PG C002-002
    
```

8F.9. Function Codes

Fujitsu OC48 Function Codes

Channel 1 1310 nm	West Function Code	Channel Bank/ Attribute	East Function Code	Channel Bank/ Attribute
UPSR	FS3CNNN2C	FJ24AW 10	FS3CNNN1C	FJ24AE 10
BLSR	FS3CNNN2C	FJ24BW 10	FS3CNNN1C	FJ24BE 10

Channel 2 1533 nm				
UPSR	FS3D4LNA5	FJ24AW 33	FS3D4HNA5	FJ24AE 33
BLSR	FS3D4WNA5	FJ24BW 33	FS3D4ENA5	FJ24BE 33

Channel 3 1557 nm				
UPSR	FS3D4LNB3	FJ24AW 57	FS3D4HNB3	FJ24AE 57
BLSR	FS3D4WNB3	FJ24BW 57	FS3D4ENB3	FJ24BE 57

Nortel OC48 Function Codes

Channel 1 1310 nm	West Function Code	Channel Bank/ Attribute	East Function Code	Channel Bank/ Attribute
BLSR	BLSRNYN	NS48W 10	BLSRNXXN	NS48E 10

Channel 2 1533 nm				
BLSR	BLSRNKN	NS48W 33	BLSRNJN	NS48E 33

Channel 3 1557 nm				
BLSR	BLSRNHN	NS48W 57	BLSRNGN	NS48E 57

Fujitsu OC48 Transmitter Requirements

Table 3

Channel Assigned	Wavelength	Transmitter Plug required
Channel 1	1310nm	Various HECl codes
Channel 2	1533nm	SN48HEHA
Channel 3	1557nm	SN48DCAA

OC48 systems assigned to channels 2 or 3 *must* be equipped with the wavelength specific plugs shown above. Channel 1 passes 1310nm of which there are many HECl codes.

9. References

For further information or electronic copies of this document and related information, visit the internal SBC Local Exchange Carrier Web site: <http://home.sbc.com/commonsystems/> or <http://apex.sbc.com>

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SBC-002-316-003	Frame Forecast M&P	Issue 8, Jul 2001
SBC-002-316-011	SingleMode FiberOptic Optical Splitters	Issue 3, Apr 2001
SBC-002-316-026	SingleMode Passive WDM M&P	Issue 3, Nov 2001
SBC-002-316-043	FDF Frame Forecast M&P	Issue 3, Nov 2001
SBC-002-316-053	Fiber Raceway Provisioning M&P	Issue 2, Nov 2001
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Infrastructure Deployment Guidelines (IDG), Transport, Tab 13	Wavelength Division Multiplexing (WDM)	Aug 2001
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TP 76200MP	SBC-Network Equipment Building Systems (NEBS)	Issued 2001
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