SBC-002-316-043
Fiber Distribution Frame (FDF) Deployment Standards

Abstract

Presented in this document are the deployment standards to implement a Fiber Distribution Frame in SBC LOCAL EXCHANGE companies Central Offices, CEVs, Huts, and Customer Premises.

Audience: The primary audience for this document are SBC LOCAL EXCHANGE companies 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, Outside Plant and Fundamental Network Planning. This document is to be used internally within SBC LOCAL EXCHANGE companies and their SBC Authorized Vendors and has a limited distribution subject to the header/footer information.
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2. Reasons for Issue/Reissue

This section will reflect the last three issues of updates for field consumption.

Issue 6, Section 4, Paragraph E3: "This Gen III type of FDF needs a thorough evaluation at each site as to its applicability. Due to their higher cost of EF&I, it is requested that NP&E corporate staff be consulted before the approval for installation is authorized at each site."

Issue 6, Section 5, Paragraph A: changed to cover Intra-office Routing Diversity

Issue 6, Section 5, Paragraph A: New Box which states "this method of provisioning is an internal guidance only. It is not intended or designed to be offered as a service to customers whatsoever".

Issue 6, Section 5, Paragraph A: Do not place Fiber optic cable in the Fiber Protection Systems.

Issue 6, Section 10, Paragraph F: Updated Fiber optic Bridges in its entirety.

Issue 6, Section 10, Paragraph I: Updated to show new Ethernet PAN that will permit the use of Fiber jumpers.

Issue 6, Section 12, Paragraph B: New para covering sequential termination assignments on panels.

Issue 6, Section 12, Para B and C are renumbered/relettered to C and D respectively.

Issue 6, Section 13: Reference Section Updated in its entirety.

Issue 6, Section 14: Contact Section Updated in its entirety.

Issue 5, Section-All: Footer changed to match new Legal statements for documentation.

Issue 5, Section-All: Change from **SBC-13STATE** to SBC LOCAL EXCHANGE companies.

Issue 5, Section-Copyright Page: Updated.

Issue 5, Section 6, Paragraph D: New Paragraph covering compatibilities between the NG3 and the NGF.

Issue 5, Section 10, Paragraph D.1: Updated sentence to reflect that older NGF bays will mate to the new NG3 bays through the use of an adapter pi

Issue 4, Section 4, Paragraph C: New Fiber Optic Connector/Mode Policy covered here for the Central Office, Point of Presence (POP) and the Customer Premises.

Issue 4, Section 4, Paragraph E1: Applicability for FDF Use with regard to Category I offices has been upgraded to include BPON FTTH/FTTB.

Issue 4, Section 4, Paragraph E1: New Category Added for Outside Plant/Customer Premises.

Issue 4, Section 4, Paragraph E2: Update to reflect the approval of the Generation III FDF and the discontinuance of the embedded NGF.

Issue 4, Section 4, Paragraph F: Updated to reflect Generation III bays and raised floor environments.

Issue 4, Section 5, Paragraph B: Emphasis added not to use 2-inch Fiber Raceway on a going-forward basis. Use 4-inch.

Issue 4, Section 6. Paragraph B: Drawings/Illustrations provided on the Miscellaneous Panel and Modules

Issue 4, Section 6, Paragraph C: Illustrations of the new NG3 Panels for the Generation III FDF.

Issue 4, Section 7, Paragraph B: Bulkhead attenuators are no longer approved for use.

Issue 4, Section 8: Manufacturers that do not develop a suitable or compatible WDM module to fit within the Miscellaneous Panel will not be permitted placement of their product within the FDF structure.

Issue 4, Section 10, Paragraph A: Addition of a New Central Office or OSP Location will dictate a new FDF.

Issue 4, Section 10, Paragraph D: New Paragraph and Sub-Paragraph sections providing information on the Generation III Frame, and layout arrangements.

Issue 4, Section 11: Section updated to reflect the standard use of the Generation III FDF.

Issue 4, Section 12, Paragraph A: Three types of FDF frame layouts that cover Assignments and cluster/panel placement and connectors.

Issue 4, Section 12, Paragraph B: TAB/db use is covered.

Issue 4, Section 12, Paragraph C: TIRKS use is covered.

Issue 4, Section 12 & 13 become 13 & 14 respectfully.

Issue 4, Section 13: Reference Section Updated in its entirety.

Issue 4, Section 14: Contact Section Updated in its entirety.

3. Introduction

The primary audience for this document is SBC LOCAL EXCHANGE companies personnel in the following disciplines; Maintenance Engineer, Transport Equipment Engineer (TEE), Facility Equipment Engineer (FEE), Digital Transport Engineer (DTE), Space Planner, Frame Planner, Long Range Technical Planners, Fundamental Network Planning, Outside Plant Engineering and NSS organizations. This document is to be used internally and has a limited distribution subject to the header/footer information. This M&P may be found on the Internal Web Site: **http://ebiz.sbc.com/commonsystems** or **http://apex.sbc.com**

This document has been updated to reflect Network Planning & Engineering (Common Systems Standards) for the following Incumbent Local Exchange Carriers, henceforth referred to as SBC LOCAL EXCHANGE companies:

SBC-SNET (Connecticut)
SBC-West operating companies (California, Nevada)
SBC-Southwest (Missouri, Texas, Arkansas, Oklahoma, Kansas)
SBC-Midwest operating companies (Illinois, Wisconsin, Indiana, Ohio, and Michigan)

The FDF is considered as an indigenous part of the Central Office or outside plant hut/remote terminal that will support the interconnection needs for customers, carriers, other telecommunications providers, switches, transport equipment and cable facilities in the serving Wire Center (WC) area. When forecasting the ultimate floor space requirements for the frame footprint, considerations are made based upon the initial 20-year projection of use by the above listed elements. The frame is deployed in a logical layout algorithm to maximize the overall life of the frame and to permit the greatest utilization of frame equipment and block assignments with the least amount of jumper congestion and blockage.

Subsequent growth requirements of the FDF will be based upon Wire Center (WC) forecasting, technology additions and growth, and the need for increases in facility placement in direct support of the community growth that the WC supports. The incremental growth of frames will be addressed in this document. It must be specified that the building structure is planned to support this initial 20-year life-of-frame deployment with associated cable entrance facilities provided throughout the length of the frame in a direct route through the Wire Center. Shorter timelines could result in increased costs due to the need to redistribute equipment and facilities on the frame to smaller frame hardware increments.

It is understood that State Utility Commissions may require a reduced interval in the forecast planning from the standard projection timelines. When this occurs, the floorspace layout should reflect the maximum permissible sizing available. The Space Planner, working with the Detail Engineering Service Provider (DESP), where applicable, shall take into account the best solution based upon space availability, most efficient design and least cost application for the frame placement and design.

The FDF supports the technology and applications based upon their optic standard requirements. It is imperative that the FDF be forecasted with the appropriate space and strategic location allocated within the Wire Center. Every effort must be made to avoid blocking the logical growth layout of a FDF or the inappropriate placement of the frame within the WC, causing the potential need for expensive additional regeneration equipment.

4. FDF Overview and Definition

4A. Definition:

A Fiber Distribution Frame (FDF) architecture serves as the primary interface between Outside Plant (OSP) Fiber Optic facilities entering a Central Office structure and the Fiber Optic equipment installed within that same location. When placed in a remote terminal or customer premises, it serves as the cross-connect point between outside plant facilities and the F2 or customer campus cabling. The FDF provides a centralized point for the organization and administration of the Fiber Optic facility and intrabuilding fiber equipment cables, provides a flexible platform for future fiber growth, and provides rearrangeable connections between any two terminations or appearances.

4B. Network Role

FDF systems are suitable for use in both large and small offices, digital loop carriers, controlled environmental vaults (CEVs), and customer premises. The systems are modular in design and serve as centralized termination, test access and cross-connection points and as distribution frames for all fiber network elements and circuits.

4C. Strategic Direction

The FDF is planned to be the primary interface and cross-connect point for all Fiber Optic products, cabling and equipment on the telecommunications horizon. This frame will continue to be the primary cross-connect point with Intelligent Network Elements such as Optical Multiplexers, DWDM, FTM, and Optical Amplifiers. The FDF is the direct cable cross-connect point for all SBC Network Elements to one another. Optical Carrier systems that use primary and protect paths for signal transmission should have path diversity for cross-connects and cabling within the Central Office beyond the initial Network Equipment lineup for high capacity services of OC-192 and higher speeds. Fiber cabling **within** a Network Element system using one or multiple bays within the same footprint may be cabled directly without termination on a FDF.

Fiber provisioning within one Central Office floor not separated by a firewall, floor or ceiling can use Fiber Raceways and Jumpers for interconnection. Network Elements placed outside of this area that need to be connected to another area will require the use of fiber cable run to the FDF, not jumpers terminated to the FDF.

All products listed in this IDG are baseline funded at this time. This product line including skeleton bays, panels and tails/stubs is classified as Major Materials and should be charged to the appropriate Field Report Code, FRC, in accordance with the Accounting Handbook Telephone Plant. The cross-connect jumpers and optical jumpers will be classified as minor materials. FDF items may be a Field Reporting Code in one of the following groups: 257C, 357C, 377C or 477C for capital items. Check with your Equipment Engineer funding Manager for the correct Account Classification Coding before ordering of FDF products.

Effective August 15, 2001, all regions will use the SingleMode SC-UPC connector as the standard on a going-forward basis per FLASH-2001-015*, SBC Construction Support ST to SC Conversion in SBC-SWBT*, dated June 2001.

Effective Jan 1, 2003, the new SBC *Fiber Optic Connector/Mode Policy* was released, SBC-002-316-078, Issue 1, dated Jan 2003. This document coupled *with SBC Fiber Optic Connector/Mode Policy Addendum by Approved Services*, SBC-002-316-079; Issue 1, dated Jan 2003 covers the following:

On a going-forward basis, this policy reconfirms that the SBC standard for Fiber Optic terminations is the SC-UPC, SingleMode interface for customers, CLECs, carriers and internal users, approved by John Monday, Vice President-Finance & Engineering Support (NP&E). This standard interface insures that network reliability is promoted through a standard network interface thereby reducing the overall costs in the network, with engineering and technical decisions becoming streamlined in a single process.

Due to the need to provide more near-term services with manufactured off-the-shelf components, SBC is modifying the policy to permit exceptions on a case-by-case basis due to technical shortfalls of Network Elements for the use of the LC-UPC SingleMode instead of the SC-UPC connector on the faceplate for small form factor connectors in the **Central Office only**. In addition, limitations on the near-term deployment of Video services for Fiber-to-the-Home will necessitate the use of SC-APC, SingleMode (Angled) connectors using an Analog signal. When the Video is converted to Digital, the connector type will revert to the SC-UPC, SingleMode. The use of SC connectors with a MultiMode method of transmission is authorized for general use at both the **Customer Premises and the Point of Presence (POP) only**. SBC-002-316-079, SBC Fiber Connector/Mode Addendum by Application Services Approval for Use will provide the specific products and services that are approved for use under the auspices of this policy. The addendum document will be updated as new services are approved for introduction into the PDP/NTI development process. As other technology requirements become **necessary and cost justified**, SBC may elect to introduce new connector/mode types on a case-by-case basis with both this document and the addendum covering these changes.

The standard demarcation point for SBC LOCAL EXCHANGE companies facilities is the SC-UPC SingleMode termination with the alternative solution being the SC-UPC MultiMode termination at the POP and Customer Premises. SBC has no obligation to construct new demarcation facilities or modify their "**as is**" facilities except through regulated retail product offerings as specified by State and Federal tariffs as a result of the Telecommunication Act's current obligations and their interpretations by the court and the commissions. The demarcation for Access Services (regulated retail product offerings) is defined in the Demarcation Policy for Access Services Terminated at Other Carrier's Point of Presence (POP) Locations only. This demarcation policy allows some flexibility for the termination of Fiber Optic facilities at Interexchange Carrier sites only; all other customer sites will receive the standard handoff connections specified by tariff.

The Generation II (LGX style) and Generation III FDF (NG3) products approved by SBC Communications will support the use of multiple types of connectors and modes within the respective panels and clusters.

4C.1. Approved SBC Central Office Terminations

The standard arrangement will be the SC-UPC, SingleMode termination within the Central Office. There are exceptions based upon manufacturer small form factor needs and specific products needs that are covered in SBC-002-316-079, SBC Connector/Mode Policy Addendum by Application Services Approval for Use. This addendum will specify the current approved arrangements in accordance with this policy and will be updated as new services are introduced into the PDP/NTI process.

4C.2. Approved Terminations for the Customer Premises Locations

The standard arrangement will be the SC-UPC, SingleMode or the SC-UPC MultiMode terminations (using a specific service offering) at the Customer Premises as specified by tariff. Specific products and service applications that are approved for use are covered in SBC-002-316-079*, SBC Connector/Mode Policy Addendum by Application Services Approval for Use*. This addendum will specify the current approved arrangements in accordance with this policy and will be updated as new services are introduced into the PDP/NTI process.

4C.3. Approved Term for Point of Presence IXC (POP) Long Distance Carrier Sites Only

The standard arrangement will be the SC-UPC, SingleMode or the SC-UPC MultiMode terminations (using a specific service offering) at the IXC (POP) as specified by tariff. In addition, the IXC (POP) locations may be provisioned through a transition jumper using a LC-UPC, SingleMode, ST-UPC, SingleMode or FC-UPC, SingleMode at the IXC's request. Specific products and service applications that are approved for use are covered in SBC-002-316-079*, SBC Connector/Mode Policy Addendum by Application Services Approval for Use*. This addendum will specify the current approved arrangements in accordance with this policy and will be updated as new services are introduced into the PDP/NTI process.

4D. FDF Guidelines

The full cross-connect architecture will be used in the SBC Local Exchange Carriers. Fire-retardant ribbon Fiber Optic cables are pre-terminated on one OSP shelf in a FDF bay and spliced to optical outside plant facilities in the cable vault. Fiber Optic interconnect cables from optical transmission and switching equipment are terminated on the rear of a Fiber Optic Termination shelf in an adjacent FDF bay. The FOT and OSP terminations will be connected via cross-connect Fiber Optic jumpers at the time a service request is initiated. Network Element terminations will be placed on the rear of FOT panels. OSP fiber terminations will be placed on the rear of OSP Panels. In most applications, an alternating bay terminating arrangement is recommended. The alternating bay arrangement segregates Outside Plant (OSP) terminations and Fiber Optic Transmission (FOT) equipment terminations into alternate bays and ensures a most cost effective deployment arrangement**. The FDF shall always utilize the cross-connect methodology in the Central Office.** The interconnection of fiber termination equipment to another within the Central Office will be through the full cross-connect design of the Fiber Distribution Frame. (Example: An OC48 with subtending OC3C will be cabled to the FDF and not directly between the two multiplexers). Under no circumstances will CO fiber equipment be directly terminated on the front access ports of the OSP panels, but it will be terminated on the rear of the FOT panels and will be subsequently cross-connected to another FDF panel.

When the equipment placement is located on another floor or a non-contiguous equipment area, a Fiber Optic tie cable terminated on OSP panels will be placed from the FDF to that remote area and terminated on a **satellite FDF** in its own bay. From this satellite location, Fiber

Protection Systems will be placed in a logical layout to support the eligible area for each Network Element. The remote area will be supported through Fiber patchcords to the Network Element allowing for rapid fiber deployments at minimal dedicated long-term costs. Network Element to Network Element cross-connects will be made at the main FDF, not the satellite FDF. Under normal circumstances, the satellite FDF will use the cross-connect arrangement for terminations to this bay.

It must be emphasized that Fiber Protection Systems and Fiber Optic patchcords will not traverse firewall partitions and floors. The direct fiber cabling to a Network Element within an established fiber jumper area is not recommended except under high connectivity requirements. The dedication of fiber capacity to specific providers or equipment should be minimized. Future Fiber Protection Systems shall be provisioned between the 8'6" and 9'0" heights allowing for fiber patchcord/fiber jumper placements via SBC Local Exchange Carrier or SBC LOCAL EXCHANGE companies Approved Vendor personnel for service requests, orders and/or equipment installations for the standard 7-foot height of FDF bays.

4E. FDF Applicability, Types & Use

4E.1. FDF Applicability

SBC Central Offices/Outside Plant are sized based on one of four categories with a fifth version trump card (Constrained Offices) used to preclude the growth of the building structure simply for the needs of the FDF. These categories have been defined by Network Operations with regard to strategic network support, customer base, internal security, collocation concentration and a series of other factors. The summary listing is as follows:

Category I Central Offices:
Category I denotes strategic offices that have tandem switching or facility hub equipment which provide for a large metropolitan area. In addition, sites that will schedule Broadband Passive Optical Network (BPON) Fiber to the Home/Business (FTTH/FTTB) within 5-years.

Category II Central Offices:
All End Central Offices that are not a Tandem switching or facility hub in metropolitan areas supporting business and/or mixed business/residential areas.

Category III Central Offices:
Small Central Offices and CDOs that are not Tandem switching or facility hubs but support predominately residential areas.

Constrained Central Offices:
A constrained office is extremely limited in the available floorspace for a lineup of bays that can be used. A regular FDF lineup would be forced to use a less than optimum layout with regard to vault access and have limited egress to the Transport/Facility and Collocation Areas. The office is near closure and could dictate a Corporate Real Estate (CRE) building growth.

Category IV Outside Plant (SLC Hut/CEV-Cust. Premises:
Geographic supported end handoff locations for Residential/Business Customers, IXC Carriers and termination points for F1 to F2/F3 cable facilities. This site may support collocation.

4E.2. FDF Types

The SBC LOCAL EXCHANGE companies standard FDF is the Generation II covered in PAN 19995259, FDF and Fiber Optic Apparatus, dated June 1999. This is characterized as the LGX style bay using 72/96 port panels. This arrangement shall be used in all SBC subsidiaries and affiliates.

The new SBC LOCAL EXCHANGE companies standard Generation III FDF has been approved via PAN-2003-3138, *SBC-Generation III FDF Approval for Use*, dated Jan 2003. This new product called the NG3 manufacturered by ADC Telecommunications will mate up with the embedded based of NGF FDF. Effective in January 2003, SBC-PAN-2003-3139, *SBC-Destandardization of the NGF FMDF* has been issued in accordance with the stipulation outlined in SBC-NOT-000-000-346 and PAN 20011120; *Restricted Product Approval Notice with Sunset Clause for the FMDF/NGF* dated Dec 2001.

4E.3. FDF Use

Fiber Distribution Frames are designed to be placed into equipment lineups within a Central Office/Outside Plant and may be up to 20 bays in a single lineup. Parallel lineups with either tie panels or Inter-lineup Bridges may be used to connect parallel lineups. The types of FDFs are as follows:

The **Generation I** is a low density Fiber Distribution Frame using a bay arrangement. This FDF has 24 to 48 Fiber Optic ports per panel and up to 11 panels per 7-foot high bay**. This FDF layout has been grandfathered and shall be capped with existing panels.** All new bays and panels will use the Generation II FDF equipment outlined in PAN 19995259 for SBC LOCAL EXCHANGE companies, FDF and Fiber Optic Apparatus dated June 1999. This type of FDF can be modified to a Generation II type, refer to applicable drawings and M&Ps. **This FDF will fit in a standard frame relay rack as a Network Bay having a 23-inch interior and 26-inch exterior width and a 15-inch depth.**

The **Generation II** is a medium density Fiber Distribution Frame using a bay arrangement. This is the SBC LOCAL EXCHANGE companies **STANDARD FOR USE**. This FDF has 72 (96 standard in SBC-SNET with the option for 96 in SBC-Midwest) Fiber Optic ports per panel and up to 9 panels per 7-foot high bay. **This FDF will fit in a standard frame relay rack as a Network Bay having a 23-inch interior and 26-inch exterior width and a 15-inch depth. This type of FDF may be grown to the end of the current lineup in any Category Central Office or Outside Plant Location. Changes to Generation III should be made upon commencement of a new lineup or at such time that the location becomes constrained.**

The **Generation III** FDF is a High Density Fiber Distribution Frame (HD-FDF) that utilizes a new frame arrangement consisting of 72 port panels (and future more dense arrangements) located within a multi-trough high-density bay arrangement. SBC LOCAL EXCHANGE companies NP&E has approved the Generation III frame for general use with All Category I Offices, Any Constrained Offices in any Category and Category IV Outside Plant Sites. **This FDF will not fit in a standard frame relay rack. It will only fit within a large bay configuration having a 36" x 36" width and depth with actual dimensions of 30" wide by 24" deep. This Gen III type of FDF needs a thorough evaluation at each site as to its applicability. Due to their higher cost of EF&I, it is requested that NP&E corporate staff be consulted before the approval for installation is authorized at each site.**

Key Chart for determining applicability for FDF use

FDF Use on a Going-Forward Basis

Central Office/Outside Plant Category[1]

Region/ Sub	Category I Normal	Category I Constrained	Category II Normal	Category II Constrained	Category III Normal	Category III Constrained	Category IV OSP
SBC-Southwest	Generation III	Generation III	Generation II	Generation III	Generation II	Generation III	Generation II or Generation III
SBC-West	Generation III	Generation III	Generation II	Generation III	Generation II	Generation III	Generation II or Generation III
SBC-SNET	Generation III	Generation III	Generation II	Generation III	Generation II	Generation III	Generation II or Generation III
SBC-Midwest	Generation III	Generation III	Generation II	Generation III	Generation II	Generation III	Generation II or Generation III
OTHER SUBS/ Affiliates	Generation II or Generation III	Generation III	Generation II or Generation III	Generation III	Generation II or Generation III	Generation III	Generation II or Generation III

4F. FDF Panel Terminations & Placements

Terminating capacity of a Generation II FDF shall be limited to 72/96 fiber connectors per shelf with a maximum of 9 shelves per bay. The top shelf (9) in each bay will be reserved for special applications such as test access, administrative access, and Fiber Splitter applications. The FDF is limited to a seven-foot environment and can have up to 20-bays in a single lineup. The FDF should be ordered to include storage of excess jumper slack between bays. The Generation II FDF uses a high-density trough system that permits the routing of Fiber Optic cross-connect jumpers of varied lengths to fit into the system without the need to custom fit or splice connectors. Both upper and lower troughs shall be used.

The terminating capacity of a Generation III FDF is currently 72 ports per panel or may use three panels placed together in a three-pack for a combined total of 216 terminations, with a maximum potential of 20 panels per bay.

[1] If the Central Office/Outside Plant location changes from a Generation II to a Generation III frame due to corporate needs, the placement of a new lineup will be required in a parallel lineup using either tie cable/panels of Fiber Optic bridges between the two lineups. Do not place Generation II and III type FDFs in the same lineup.

In extremely small Central Offices, the first FDF bay can be used in a combination mode with the FOT panels on the bottom and the OSP panels on the top. Any growth beyond the first bay will require the existing pattern be carried out through out the lineup. If in doubt as to the growth of the office, then care should be used to place the frames in the normal arrangement of OSP-FOT-OSP-FOT…. See Section 10D.3 of this document for more details.

The use of 24 SC-UPC connectors per shelf is not approved for use per PBEL #2812-1 dated 3/98, except in outside plant situations.

With each frame, insure that the correct panel and fiber tail orientation is considered. In the first quarter of 2002, SBC LOCAL EXCHANGE companies began provisioning new switchroom space in a raised floor environment. This dictates that the cable orientation, left verses right, and the feed direction, match the route of cabling. With the raised floor arrangement, all Fiber Optic cabling will be bottom fed to network equipment and the FDF. The Fiber Raceway feeds from the bottom of the respective bays.

4G. Fiber Optic Cross-Connect Jumpers

A Fiber Optic Jumper is defined as cross-connect jumper located at the FDF to cross-connect the OSP termination to the FOT termination. Fiber Optic Patchcord is defined as the connection between the Network Element and the rear of the FOT shelf located in the FDF.

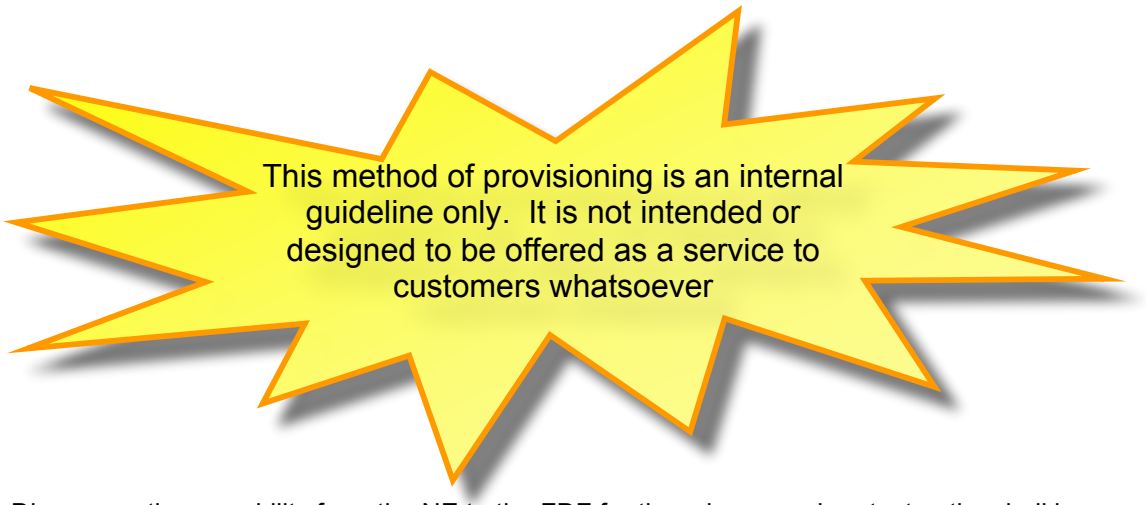
Fiber Optic cross-connect jumpers shall be ordered in the near correct lengths in order to properly place the connection from the two fiber panels (OSP-FOT), (FOT-FOT), or (OSP-OSP) on Generation I FDF systems. **DO NOT PERMIT EXCESS CABLING TO BE ORDERED OVER 5 LINEAR FEET FOR ANY JUMPER.** On Generation II and beyond FDF systems, the fiber jumpers should be provided in 5-foot increments and should not be less than 10-feet for any one-jumper cross-connect. Sufficient storage is available on 72-96 panel fiber systems. The Generation III FDF jumpers should be provided in 5-foot increments and should not be less than 10-feet for any one-jumper cross-connect. In any case, the Fiber Optic jumpers shall be ordered from a Procurement approved manufacturer. Fiber cross-connect jumpers used for cross-connects should be provided by the Local Field Operations (LFO)/Network Operations and the Fiber Optic patchcords for network element terminations should be ordered by the local engineers. The local Equipment Engineer may elect to provide fiber cabling to Network Elements in lieu of fiber patchcords. Fiber Cabling is strongly recommended for high use Fiber Optic Network Elements such as OC 192, Dense Wavelength Division Multiplexers and other high-speed product lines.

5. Fiber Protection System (Raceways)

5A. Intra-office Routing Diversity

The Fiber Protection System is rated as standard and represents a separate and unique Fiber Optic protection system used only for Fiber Optic patchcords/fiber jumpers between Transmission and Switch equipment and the FDF**. Do not place fiber cable within the Fiber Protection Systems.** All equipment which uses Fiber Optic connectivity will hub to the FDF for all intraoffice connections. This protection system will provide both separation from all other cable racks and will provide a protection of the Fiber Optic patchcords/fiber jumpers from installation activity in a Central Office. The Protection System will provide both the separation from all other cable racks and will provide a protection of the fiber optic patchcords from installation activity in a Central Office.

The Protection System will provide the routing capability for the SONET ring paths for **both** primary and protect connections from the Transport/Switch equipment to the FDF. The fiber pairs will be cross-connected at the FDF to either OSP Facilities or to other intra-office equipment.



Diverse routing capability from the NE to the FDF for the primary and protect paths shall be required for high capacity services such as OC-192 or higher speeds. Diverse routing may be accomplished in two ways:

Example 1: By placing working and protect fiber patch cords on opposite sides of the same physical raceway (Similar to timing leads)

Example 2: By placing working and protect fiber patch cords in completely separate physical raceways.

It is not necessary to add multiple raceways down the same lineup simply to achieve route diversity, thus a maximum of only one raceway path per lineup will be allowed. Route diversity will be achieved via main aisles, not line-ups. NOTE: Once an ILEC high speed Optical Carrier system such as an OC-192, its equivalent or higher speed system has been placed in the Central Office, diverse routing for connections between the high speed Optical Carrier and the FDF need to be accomplished via example 2 listed above. The Fiber Protection System for Optical Carrier speeds less than OC-192 can be accomplished by example 1 or 2.

The use of direct cabling from a Network Element Interconnect Bay within the same footprint of the manufacturers equipment or cabling to a specific lineup (satellite arrangement) to the FDF will not require diverse routing.

The Protection System will be provided to within 2 inches of the Fiber Distribution Frame (FDF) and located to the adjacent vertical trough and at the same level horizontally as the Transport/Switching Equipment termination point on the primary and protect routes. The Protect jumper will be routed differently through a parallel Fiber Protection System to the FDF. **Fiber Optic Cables will not be placed in the raceway/duct work of the Fiber Protection System.** Fiber Optic Cable placements within the Central Office will adhere to merged practice standards as outlined in BSP 800-003-150MP and Fiber Raceways will adhere to SBC-002-316-053, *Fiber Raceway Provisioning M&P*. The SBC LOCAL EXCHANGE companies Standard Drawing is SBC-C-50001-E-00.

5B. Fiber Raceway Topology

The FDF shall be the primary hub for the SBC LOCAL EXCHANGE companies Central Office fiber optic facilities. The Fiber Protection System will be the primary tool for fiber optic cabling on each floor, but not between floors. The FDF will be treated as the common cable entrance and cross-connect point. When there is a need for Fiber Optic cabling to equipment on another floor, a tie cable will be terminated in a shelf on the FDF and will be directly terminated on a new satellite FDF bay on that other floor using an OSP shelf. The Fiber Protection Shelf will be extended from the FDF's to the equipment involved. With the deployment of high capacity Optical Carrier systems such as OC-192 and higher to the Fiber Distribution Frame, it is strongly recommended that any FDF that has the forecast to provision OC-192s within the next 5 years should have primary raceway routes from the Optical Multiplexers to the FDF provisioned or reinforced with 12" wide Fiber Protection System troughs. In addition, the Fiber Protection System over the FDF should have 12" wide horizontal troughs and 4" wide vertical troughs as a minimum throughout its length.

Do not permit cable buildup of fiber jumpers to exceed 2-inches in depth at any point within the Fiber Protection System. **The minimum trough size is 4-inches; do not use the 2-inch for optical feeds on a going-forward basis. In addition, use rectangular vertical troughs to bays, not "vacuum hose" arrangements.**

6. Optical Patch Panels

6A. Older LUSCIE/LUSCIU Type Panels

The optical patch panel (typically an interconnect panel) was intended to be used where a small number of fibers would be terminated. These panels mounted in standard relay racks, are typically configured as an "interconnect" system in which only the Outside Plant fiber appears at a connector on the panel. A Fiber Optic Terminal "cables" to the OSP connection with a Fiber Optic patchcord, run in a fiber protection system, from the FOT bay to the bay containing the optical patch panel. The interconnect panel is not specifically designed as a cross-connect point using fiber jumpers. It has limited devices for managing excess jumper slack or to prevent micro bending of the jumpers. *Interconnect panels such as a stand-alone LUSCIE panel shall not be installed in the Central Office. Older Interconnect panels should have the fiber cable rolled (transferred) to the FDF at the first opportunity and it is mandatory at such time that the first OC-192 or higher speed system is deployed in the Central Office.*

6B. Miscellaneous Panels

Single Mode Fiber Optic Splitters may be used as a service termination panel and will be placed within the Central Office Fiber Distribution Frame or on the customer's premises as the Fiber Optic demarcation point. These units may be used as the Demarcation Point for the regulated service, a handoff point for a Certified Local Exchange Company (CLEC) at a Point of Termination (POT). Where CLECs have a POTless termination, there will not be splitters placed on the fiber strands at either the FDF or the CLEC. For dark fiber circuit provisioning, single mode fiber splitters may be placed at the "A" and "Z" termination points of the circuit.

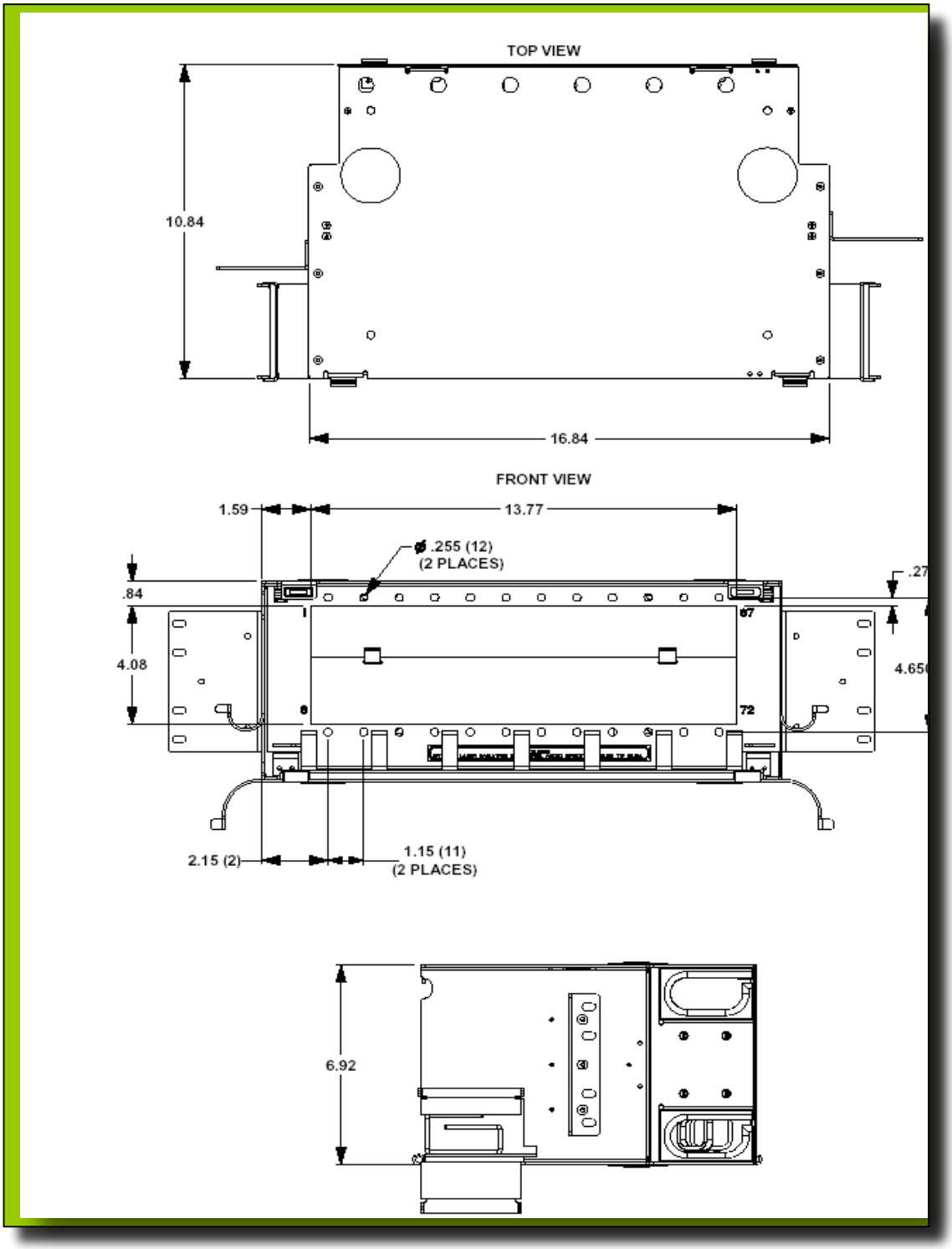
In addition, Wavelength Division Multiplexing (WDM) modules may be used within the same miscellaneous termination panel. This equipment is covered in more depth, SBC-002-316-026, *SingleMode Passive WDM M&P*, Issue 3, dated November 2001.

Warning: Fiber Optic Splitters do not currently fit into the old NGF design of the FDF used in SBC-Midwest. Another standard LGX type bay or new Generation III NG3 bay (preferred) will need to be ordered.

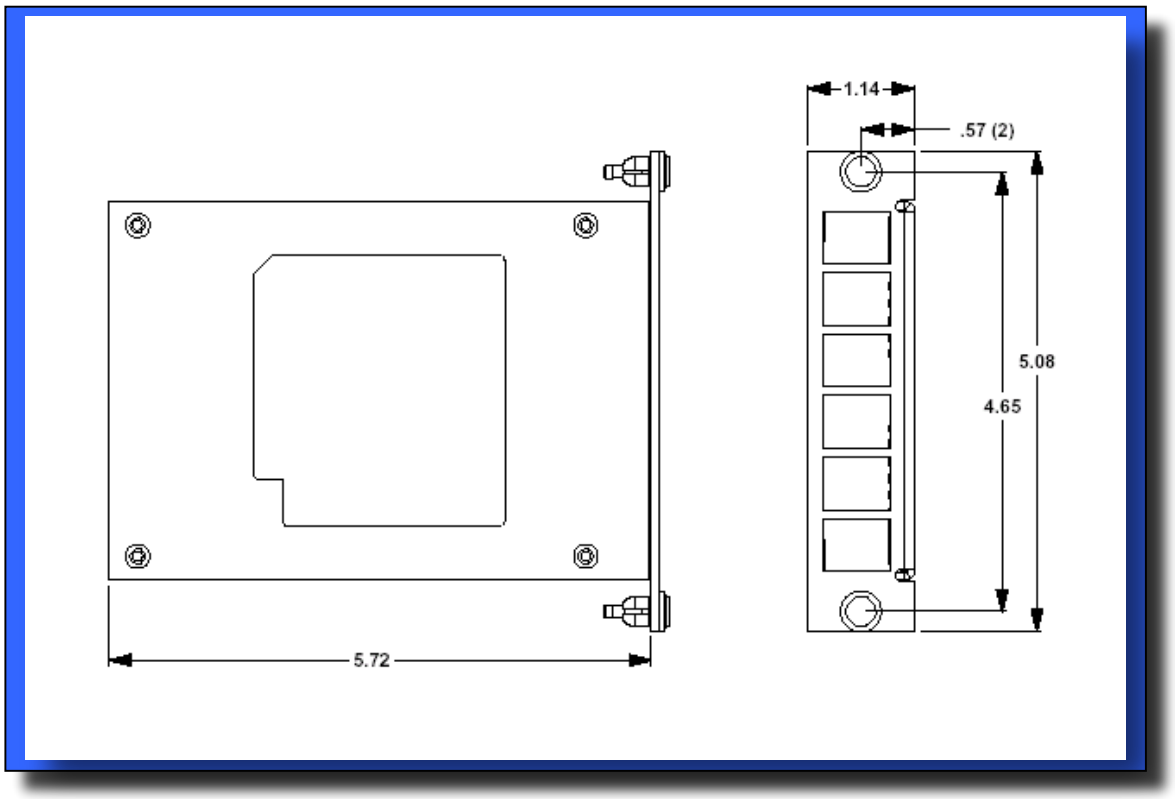
Traditionally these would be located at the FDF or a customer premises. The long term strategy for fiber test access will be to use an integrated test vehicle located at the FDF, which will provide for automated and remote testing and sectionalization of the entire optical path. The future system will mitigate the need for mass deployment of single-mode Fiber Optic splitters. Multi-mode Splitters are not approved or suitable in the SBC Local Exchange Carrier Network.

This shelf will displace Generation III FOT/OSP Panel slots 19 and 20 at the top of the bay when used.

Refer to Infrastructure Deployment Guidelines, Transport, Tab 12, *Fiber Optic Splitters*, dated Jan 2003 and SBC-002-316-011, *SingleMode Fiber Optic Splitter M&P*, Issue 3, dated April 2001.



Drawing of the standard Miscellaneous Panel approved for use in SBC.



Drawing of the Miscellaneous Module Plug-In Design.

6C. Generation III (NG3) Panels

The Next Generation III (NG3) panels manufacturered by ADC Telecommunications meet the requirements of SBC and Telcordia GR-449-CORE, Issue 2, date Jan 2003 for the new Generation III type of Fiber Distribution Frames. This new panel uses a high capacity arrangement in half the space that a standard Generation II type of panel would currently use. This panel is front mounted and can be installed in the Generation III Large frame bay.

Special Fiber Arrangement for Network Equipment covered in SBC-PAN-2003-3148 issued in Jan 2003 for outside plant arrangements or in a new NG3 bay (large footprint) for Central Office use, but not in an existing Generation II bay.

Illustration of the Generation III Panels in the closed configuration

Illustration of the NG3 Panel in the open configuration fully loaded.

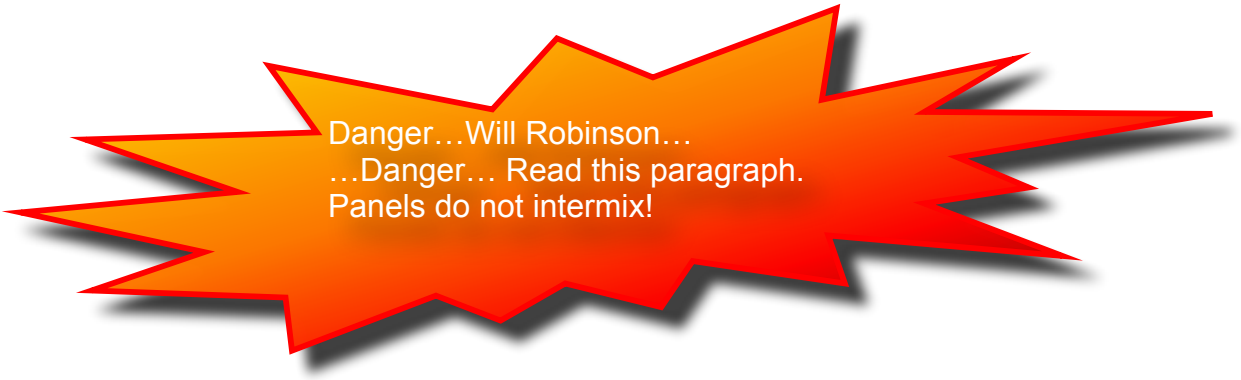
6D. NG3 to NGF Compatibility Arrangements

6D.1. Bay Interconnection

Existing lineups of the older NGF type of Generation III FDFs located in SBC-Midwest will be required to order a transition part to convert the end of the bay to mate with the new NG3 Generation III style FDF. Once converted, do not convert back to the NGF, each conversion part adds 6-inches to the lineup length.

6D.2. Panel Use

The cluster panels used on the NGF old style Generation III FDF will not work on the new NG3 Generation III FDF. If you have an old supply of FOT or OSP cluster panels for the NGF, the Outside Plant or Equipment Engineer will need to return these panels when the new NG3 style frame is deployed.



The NG3 panels are backward compatible to the Generation II LGX style of FDF but will not work with on the NGF Generation III FDF. The bottom line: ADC Telecommunications Generation III panels will only fit into their respective Generation III Fiber Distribution Frames. Do not intermix these panels and bays.

7. Optical Terminations/Connectors

7A. Overview

The use of Fusion Splices is rated as Standard. Mechanical Splices will only be permitted on an exception basis for the immediate service restoration of damaged facilities. Mechanical splices will not remain in place for any longer than 30 days before conversion to a fusion splice. Biconic Splices shall not be used for new Fiber Optic Services. Biconic Connectors may not meet the technical specifications necessary for optical transmission of OC-48 and higher services. Existing Optical Signals and spare fiber terminations with Biconic Termination Connectors must be replaced at the first opportunity or activity associated with that facility or the forecasted deployment of OC-192 or higher speed services within that location within the next five years.

The standard termination in the Central Office for SBC-West, SBC-Southern New England Telecommunications, SBC-Southwest and SBC-Midwest is the **SingleMode SC-UPC connector**. Effective August 1, 2001, the standard termination for SBC-Southwestern Bell was changed to the SingleMode SC-UPC connector on a going-forward basis, refer to FLASH-2001-015, dated Jun 2001. The embedded base of ST-UPC connectors will still be supported for the foreseeable future but all new panels will have the SC-UPC connectors. These connector uses will be handled as standard within the respective Local Exchange Companies for all Fiber Optic provisioned services (Asynchronous, OC3, OC3C, OC12, OC48, OC192, WDM, DWDM and any other Fiber Optic speeds not listed). Effective September 1999, Biconic Termination Connectors will be manufacture discontinued. Future cabling should be reterminated with the standard connector for their area in the existing LUSCIE panel or transition the cable to a FDF panel.

If a manufacturer's Network Equipment platform requires a special miniature form factor connector; SBC LOCAL EXCHANGE companies has approved the use of the SingleMode LC-UPC Connector for Network Element backplane connections only, not the FDF.

SC-APC (Angled Polished Connectors) will need to be used on all optical paths for BPON FTTH. This will include both the subscribers supporting Central Office and all cross-connects and intermediate Central Offices between the Head End transmitter of the Analog Optical Signal to the subscriber supporting Central Office. This service application requirement is covered in more depth in SBC-002-316-072*, SBC BPON FTTH Common Systems Provisioning for SBC-West (California)*, Issue 1, dated Jan 2003.

All other connections for the fiber connectivity of the circuits and facilities will be with the SC-UPC connector/mode in the Central Office unless modified by the SBC Fiber Optic Connector/Mode Policy.

7B. Attenuators

Attenuators are placed at the Fiber Distribution 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. "In-Line" attenuators are rated as standard for use and will be placed to pad the signal and shall only be placed between the FOT panel and the fiber jumper. Never place an attenuator between two Fiber Optic jumpers in the Fiber Protection System (Yellow Raceway) or the FDF troughs, but in the FOT panel itself. Attenuators should not be placed on the Network Element equipment side of the Fiber Optic patchcord except under unusual circumstances where the fiber connections are secured from incidental hazards and potential service outages. "Bulkhead" Attenuators are rated as standard for up to (Low Power-Not Multiplexed) OC-48 (10 MEG) speed services, but not for services at (High Power) OC-48 or higher speeds and power levels per SBC-NOT-000-000-473, *SBC Optical In-Line Attenuator Standard*, Issue 1, dated June 2002. The In-Line Attenuators are recommended on a going-forward basis for any attenuated fiber signal.

7C. Care & Cautions

1. First and foremost, it is extremely critical that all technicians working on Fiber Optic 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 FDF 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 Fiber Optic transmissions operate in the negative (-) dB range, but with newer Fiber Optic 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 path. Insure that your calculations account for this in your optical loss budget.

4. Based upon recent Telcordia Technologies findings, burnishing or cleaning the ends of the fiber connections is the normal expected process before service is placed on the fiber connections. With the advent of new higher power services, this method must be modified per the following table:

When to Burnish/Clean Fiber Optic 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 when field fusion splicing is performed.**	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

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

8. DWDM, FTM, WDM and Optical Splitter Deployments

Dense Wave Division Multiplexing (DWDM), Wavelength Division Multiplexing (WDM), Optical Frequency Division Multiplexing (FDM), Optical Amplifiers and Optical Splitters will be terminated at the Primary Fiber Distribution Frame in either dedicated Fiber Optic Terminal Panels or Miscellaneous Panels. Insure that these panels are placed at the top of OSP and FOT bays in the top (ninth) slot for Generation II or the top two (19th & 20th) slots for Generation III FDFs. Manufacturers that do not manufacture vertical modules that will fit the miscellaneous style panels will not be permitted to terminate within the FDF structure.

All Fiber Optic cabling between one Network Element and another or to OSP Fiber Cable will be cross connected through the FDF Frame. Only fiber cabling within the same Network Element footprint space may be direct cabled. Example: Fiber connectivity between bays within a Tellabs 5500 DCS. If the DCS in this example requires fiber interconnectivity outside the DCS, all cabling would be through the FDF. Refer to Infrastructure Deployment Guidelines (Transport) Tabs 4, 12 & 13 for further details.

The DWDM system standardized by SBC dictates the use of a special MPT/MPO cable to an adjacent ADC fiber interconnect bay. Both of these bays will be a part of the manufacturers Network Equipment. The interconnection bay will convert the MPT/MPO cable to standard SC-UPC connectors and will then be cabled to the FDF for termination. Any circuits or facilities will be cross-connected at the FDF only, not at the interconnect bay.

9. FDF System Management

The Fiber Administration System (FAS) development has been supplanted by an SBC LOCAL EXCHANGE companies internal development effort as a part of TAB/db. This effort will work to accomplish the following tasks, see Section 12 for more details:

1. Capacity Management Tool
2. Project Management Tool
3. Transport Build Efficiency Routing Process
4. Integrates the Wire Center Forecast (WCF)
5. Determination of Connector and Cable Termination Types

The orientation is to provide support to the Transport Equipment Engineer (NP&E) groups for provisioning of bays and panels. The TAB/db inventory system is being enhanced to cover the dedication of cable assignments on FDF panels. TAB/db will not provide Circuit Level assignment reference points or jumper cross-connect routes.

10. FDF Planning Guidelines

10A. Primary FDF

Consideration for use or transition to a FDF shall be when:

1. A new Central Office/OSP location has been constructed.

2. New fiber cable is to be placed in the Central Office.

3. When Central Office rearrangements or other type activities occur that will affect floor space.

4. Older technology or Manufacture Discontinued FOT equipment must be upgraded, such as the migration off older fiber interconnection arrangements (such as a LUSCIU and/or LUSCIE panel).

5. Cable activity causes rearrangements, cable throws, or services that require fiber connectors to be changed and upgraded.

6. Collocation Fiber Optic requests initiated in support of the Certified Local Exchange Carrier's service requirements.

10B. Satellite FDF

Consideration for the addition of a Satellite FDF shall be when:

1. A new floor, different from the floor where the primary FDF is located within the Central Office.

2. The new location for Fiber Optic Relay Rack terminations is separated by a firewall, floor or ceiling away from the primary FDF.

3. Use Fiber Cabling between the Satellite FDF and the Primary FDF instead of Fiber Jumpers.

10C. Fiber Protection System

Consideration for transition to larger 12-inch wide Fiber Protection Raceway Troughs:

1. A New Central Office/OSP Location is deployed.

2. An OC-192 or larger is forecast for deployment within 5 years.

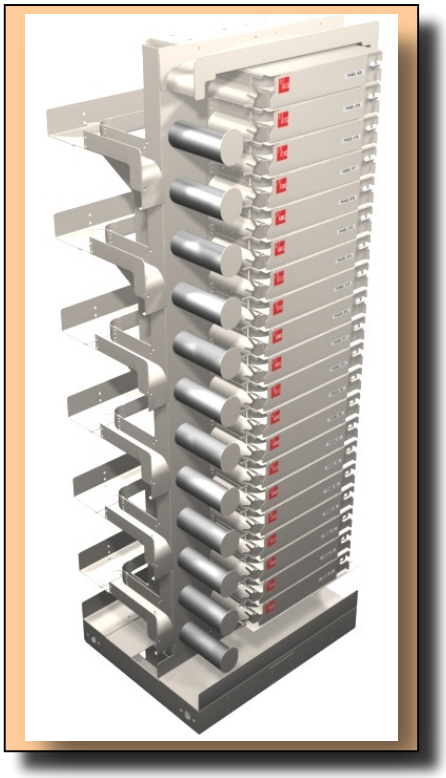
3. The office does not have diverse routing for the Raceway.

4. Deployment of fiber based technologies occurs in areas within the Central Office separate from the exiting fiber based technologies thus creating the need for fiber links between the areas.

5. Do not use the Fiber Protection System and Fiber Jumpers through firewalls or floors. Use Fiber Cable.

10D. High Density (Generation III) FDF

10D.1. New High Density Standard



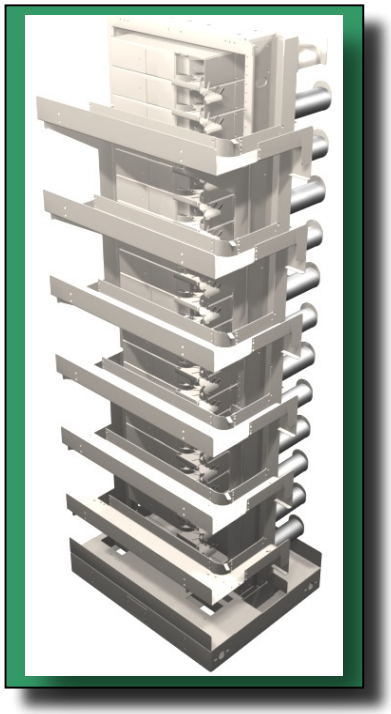
The picture to the right displays the front face of the new Generation III NG3 Bay loaded with twenty empty 72-port panels. From the six rear troughs, optic cross-connect jumpers are run through the front to rear trough to reach the slack storage mounted in each bay. All jumper feeds will made on the left side as seen from the front.

Up to twenty panels may be placed in each NG3 bay doubling the capacity over the Generation II (LGX) style FDFs currently in use.

The top two panel sections (slots 19 & 20) may be displaced providing for the placement of tie panels or miscellaneous panels for passive multiplexing in accordance with the Miscellaneous Shelf standards.

Each shelf opens to the left to a full 90° degrees in order to permit ready access and provide for the maximum passive optical protection for our personnel.

Use Section 4E.3. of this document to determine the suitability of this Generation III type FDF to your location.



The picture to the right displays the rear of the new Generation III NG3 FDF for use by SBC. As can be seen in this arrangement, the bay provides for six rear troughs that interconnect with adjacent bays in the common lineup. These troughs will mate with the embedded and destandardized NGF bays (with an adapter piece) that were previously used in SBC-Midwest operating companies.

Each panel is rear fed by fiber cables and/or jumpers to provide either OSP cabling or Network Equipment.

The top panel must have at least 10-inches of space at the front of the bay since the panel opens forward and above the panel.

10D.2. Layout

Generation III bays have the physical dimensions of 84-inches high x 24-inches deep x 30-inches across, each bay having their own built-in spacers within this space. This dictates that the bay must fit within the large bay arrangement for Space Planning purposes. The FDF needs to be placed in a logical location within the site to provide simplified and least cost access from cable vaults and Network Equipment locations. Locations for consideration would be space between columns in a Central Office or in locations near BDFB placements (since they dictate the same space and aisle considerations).

The Generation III FDF Lineup can have as many as twenty bays. This footprint may have up to four parallel lineups of twenty bays each. The lineups may either be connected via tie panels or fiber bridges (preferred) to facilitate cross-connect interoperability.

The physical placement of the lineup must accommodate both front and rear access providing of a full 36-inches between parallel lineups on both front and rear. If a new lineup is started using the Generation III bays after an embedded Generation II (standard bay) arrangement is already in service, strive to place the new lineup adjacent to the Generation II lineup, or within the closest proximity. A transition bay from the NGF to the NG3 will be required to migrate from these two Generation III systems.

Do not intermix standard bay (Generation II) with large bay (Generation III) FDFs in the same lineup unless the office is considered Constrained. Even in this instance, exceptional care must be exercised to provide for transition end guards and Fiber Raceways in excess of the normal standard to compensate for transition choke points between these two types of frames.

The long-term outlook with the deployment of BPON FTTH/FTTB will transition the FDF into the new standard cross-connect frame of the future supplanting the functionality of the existing copper main frames. The need for proper management in an FOT alternating OSP bay arrangement cannot be overstated to provide for a consistent layout of terminations. At such point that “O-O-O” of “O-E-O” Cross-Connect Machines are commonly deployed, the terminations for these products will need to be dispersed in separate panels across the FDF in each FOT bay in a similar manner that a COSMIC copper frame would expect to have OE Grids distributed. The use and maintenance of the TAB/db system for assignments will be a critical resource in the future to properly manage the FDF frame assignments.

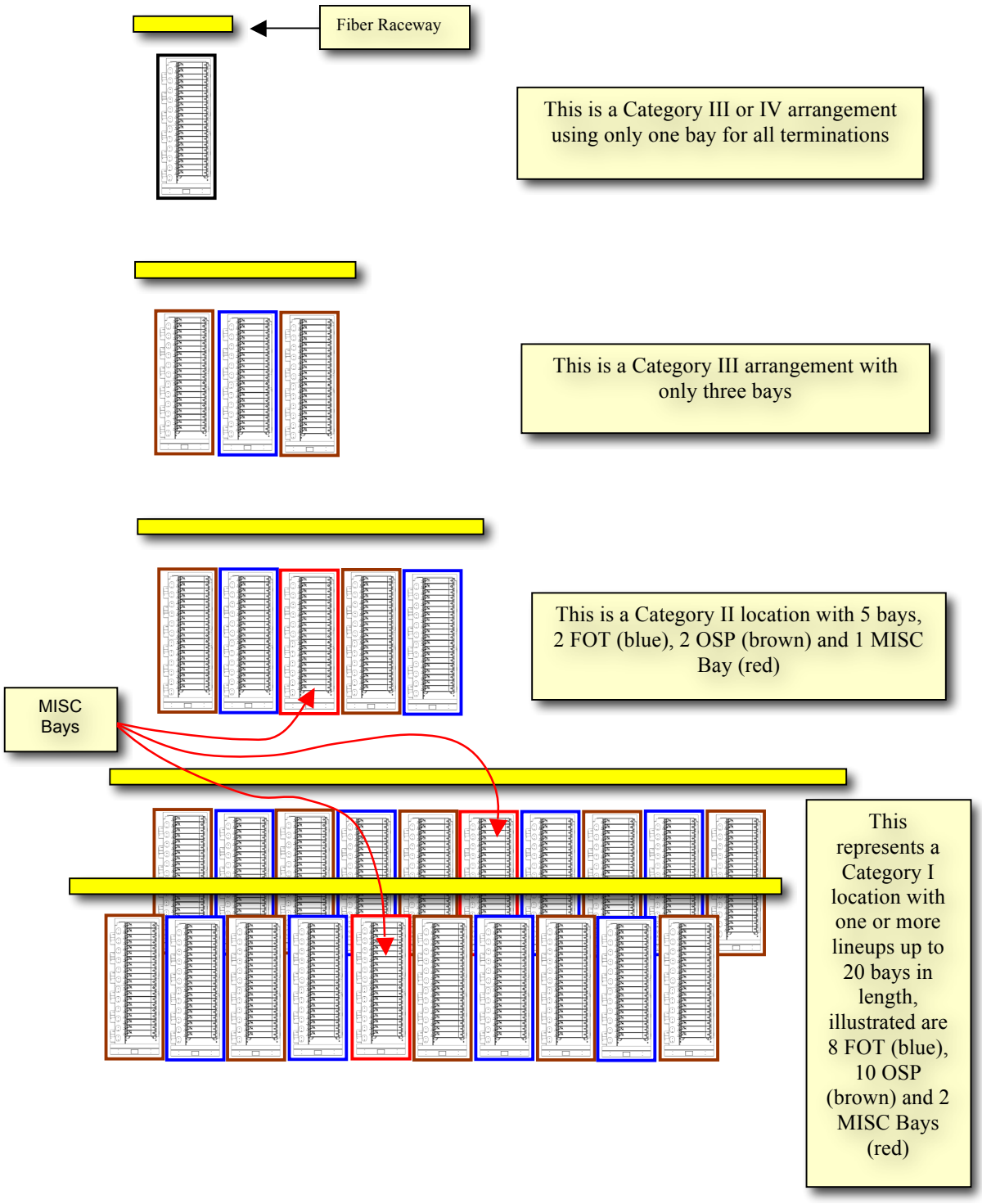
10D.3. FDF Arrangements

FDF layouts in the Central Office and Outside Plant sites will vary in size based upon the needs of business and the complexity of the existing office topology. The new Generation III FDF has three major components:

- The FOT Bay used for Network Equipment and CLEC terminations
- The OSP Bay used for Outside Plant Cabling terminations
- The Miscellaneous Bay used for additional slack storage, phone, drawer, etc.

It is expected that the FOT and OSP bays will alternate in placement in the same lineup with the Miscellaneous bay being placed in the forecasted center of the overall frame lineup. It is not anticipated to have more than one Miscellaneous Bay per FDF lineup and will not be deemed necessary for bay arrangements less than 5 bays.

Sample arrangements are illustrated below:



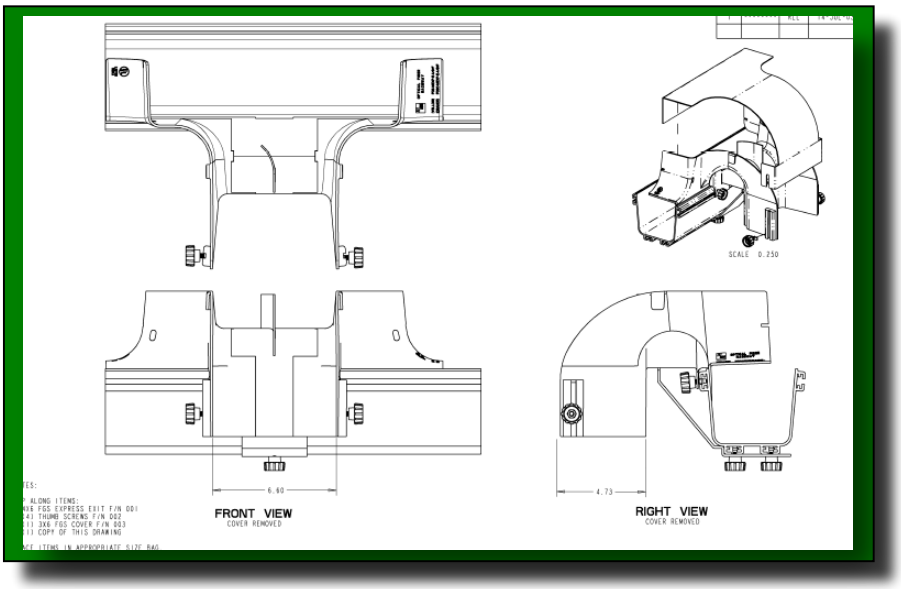
10E. Raceway and Turndown Provisioning

Turndowns used on the existing Fiber Optic Raceways (FiberGuide) will use Snap-On "Express Exit Unit" 2"x2" waterfall parts shown below (do not use the old generation cut-in downspouts) for Generation II style frames:

ADC Manufacturer Part Number	SBC-Region PID Generation II Type FDF	Distrib. Price	Supporting Drawing Documents
FGS-MEXP-A/B/F	SBC-Southwest, SBC-West, SBC-Midwest 301041026	$71.30	SBC-C-500001-E-00
FGS-MEXP-A/B/F	SBC-SNET 3582533	$71.30	SBC-C-500001-E-00

Turndowns used on existing pr new Fiber Optic Raceways (FiberGuide) will use Snap-On "Express Exit Unit" 4" x 6" waterfall parts for Generation III style frames. Do not use the 2" x2" type of the Generation II FDF systems (shown above) or the old generation cut-in downspouts due to congestion.

ADC Manufacturer Part Number	SBC-Region PID Generation III Type FDF	Distrib. Price	Supporting Drawing Documents
FGS-MEXP-G-A/B/F	SBC-Southwest, SBC-West, SBC-Midwest 301084984	$194.95	SBC-C-500001-E-00
FGS-MEXP-G-A/B/F	SBC-SNET 3585350	$194.95	SBC-C-500001-E-00



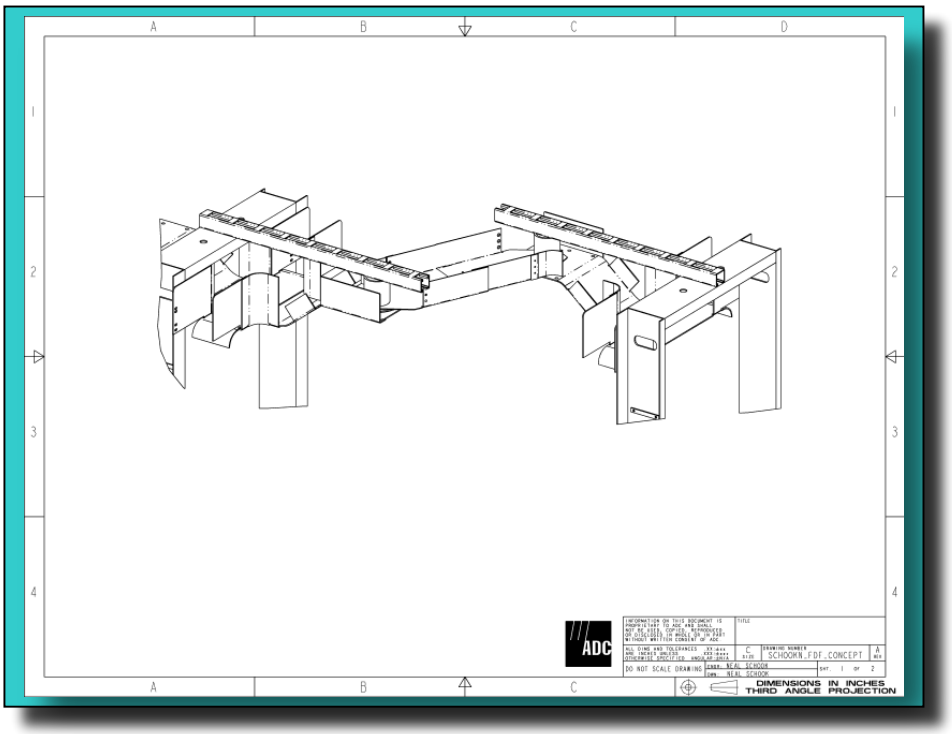
Illustrative Drawing of the 4"x6" Express Exit

10F. FDF Fiber Bridges

FDF Fiber Bridges are simply adjustable cross-aisle trough systems that connect to the top level of a Generation II horizontal trough or a Generation III system that connects from the top horizontal pathway of the NG3 frame system. This product has been approved under SBC-PAN-2003-3146, *Fiber Optic Bridges for Parallel FDF Lineups*, Issue 1, dated June 2003 and covered in SBC-002-316-074, *Fiber optic Bridging for the FDF*, Issue 1, dated Jun 2003. The placement of bridges should be made at regular intervals, normally at every fifth bay in the lineup when multiple parallel bay lineups are used. Do not place bridges at the end of FDF lineups.

For safety sake, insure that rolling ladders are restricted from the area where the fiber bridges are in place. The purchase of floor rolling 6-foot ladders will be warranted in this case. **In addition, do not place string aisle lighting or other racking materials within 6-inches of the bridge components in order to provide the proper clearances for materials and adequate human factors access for technicians.**

Fiber Bridges can be used between multiple parallel lineups through the same bay. Recognize that the utilization of the top slots will be restricted for rapid egress of fiber jumpers and will require the displacement of the top three panels (18 through 20) in the Generation III (NG3 style) FDF bay where the Bridge is located and will typically be placed in a Miscellaneous Bay. The top two panels will be displaced on the Generation II (LGX style) FDF bay.



Illustrative drawing of a Fiber Optic Bridge that will be placed across an aisle between two parallel FDF lineups.

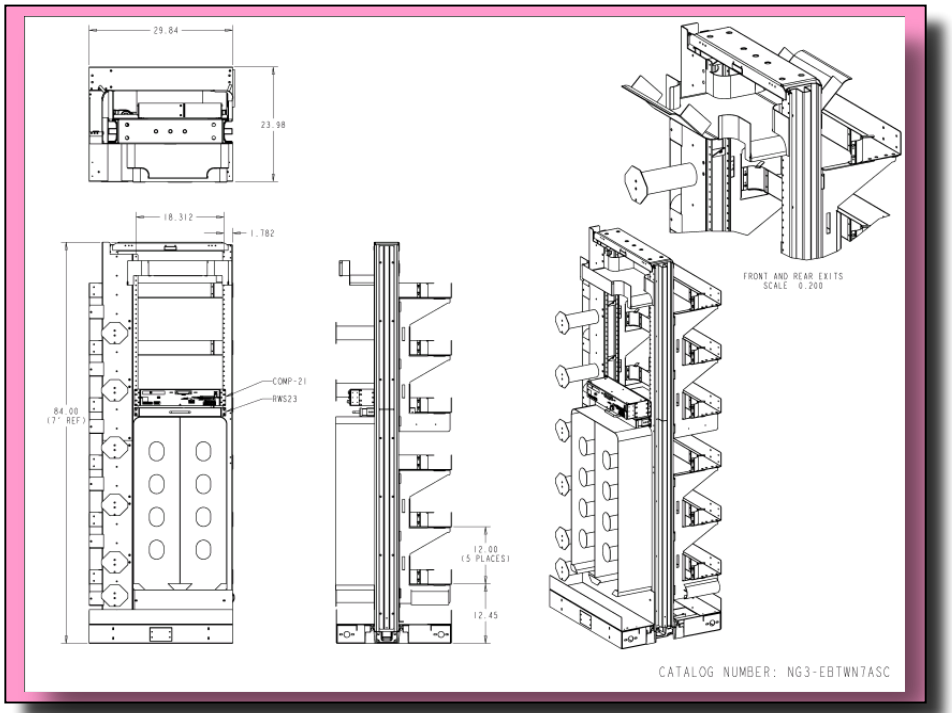
10G. NG3 Miscellaneous Bay

The NG3 Miscellaneous Bay is the expected bay that will perform several functions (refer to the illustration drawing on the next page:

- Phone Communication
- Working Tabletop Drawer
- Fiber Jumper Storage for significant over-runs
- Fiber Bridge interface to adjacent lineups
- Available Top half for Miscellaneous WDM, Optical Splitters and Tie Panels (if used)

It is expected that the FOT and OSP bays will alternate in placement in the same lineup with the Miscellaneous bay being placed in the forecasted center of the overall frame lineup. It is not anticipated to have more than one Miscellaneous Bay per FDF and will not be deemed necessary for bay arrangements less than 5 bays.

Do not place the Miscellaneous Bay at the end of a lineup.



NG3 FDF Miscellaneous Bay

10H. Other Fiber Splice Arrangements

10H.1. Ancillary Splice Housings within the FDF

A stand-alone ancillary Fiber termination or splice housing may be placed in the Generation II or Generation III FDF, yet is not recommended. The best choice will be to use an OSP panel that has tails/stubs pre-provisioned in a "three-on-a-stick format". This arrangement provides a 216-strand tail for termination at the cable head or vault and slits within the cable to three 72-strand cables that connect to three OSP panels placed together within the same FDF bay.

10H.2. Outside Plant Arrangements

OSP terminations and panels that terminate within relay racks are covered by this document. Fiber optic cables and splice housings that do not terminate within these bays will be covered in other Outside Plant Documents that discuss Splice Housings. For outside arrangements, a series of PANs have been issued that provide for front slide shelf access for both jumper and cabling in tight, constricted areas. Refer to the following PANs for further information:

PAN 19995259	*Frame (FDF) and Fiber Apparatus*, Issued June 1999
PAN 19995259.001	*FMT Panels Approval For Use*, Issued June 2002
PAN 19995259.002	*OSP Panels w/ Tails/Stubs Approval for Use*, June 2002
PAN 20021012	*Fiber Management Tray for OSP*, June 2002
SBC-PAN-2003-3148	*Special Fiber Bay Approval for Use*, Issued Jan 2003
SBC-PAN-2003-3146	*Fiber optic Bridges for the FDF*, Issued June 2003

10I. Special Fiber Bay Arrangements

Due to the unique requirements for some Network Equipment Fiber placements and the need to use especially tight fiber management arrangements within the same footprint of this equipment, SBC has developed new panels and bays to support these arrangements. It should be noted that these PANs provide panels and ancillary apparatus that will not be used in the Central Office FDF. Refer to the following PANs for further information:

PAN 20021030	*Fiber Breakout Bay PAN for the Nortel OPTera Connect DX Platform* Issued Apr 2002
SBC-PAN-2003-3148	*Special Fiber Bay Approval for Use*, Issued Jan 2003

In addition, fiber jumpers may be placed within the trough systems developed for Ethernet Distributing Frames (EDF) covered in the following PAN:

SBC-PAN-2003-3161 Optical and Electrical Ethernet Products, Issued Mar 2003

10J. Contracts & Financials

Per SBC Product Approval Notices (PAN) listed in the reference section of this document and the approval of the Common Systems-Cross Functional Sourcing Team (CS-CFST), ADC Telecommunications is the standard manufacturer for Fiber Distribution Frames. The ADC product (Generation II and III), Frames, Fiber Panels and their associated tails and Fiber Protection Systems are rated standard. Any substitution of product from established standards will require a One-Time Approval through the appropriate SBC Services NP&E corporate engineering staff. All products listed in the referenced PANs are baseline funded at this time and are referenced in Section 13 of this document.

11. Frame Placement Strategy

The Equipment Engineer (TEE/FEE/DTE) will request a forecast of demand for FDF frames. In addition to the Forecasting Organization documentation, input can be received based upon strategic Business Initiatives, Customer demands and sales, Marketing Organizations, Collocation demands, and from internal work forces such as:

Local Field Operations/Network Operations
Outside Plant Engineers
Maintenance Engineers
Trunking and Inter Office Equipment Engineers
Digital Transmission Engineers (title will transition to Transport Equipment Engr)
Facility Equipment Engineers (title will transition to Transport Equipment Engr)
Architecture Planning Engineers
Fundamental Planners

The NP&E Forecasting Organization will determine the growth requirements; service needs and expected growth expectations through the following detailed forecast analysis:

Wire Center Area Forecast (WCAF)
Outside Plant (Feeder) Forecast (OSPF)
High Capacity Forecasting (HICAPF)
Wire Center (Switch) Forecasting
Seasonal Factors/Functional Pricing Forecasting
Volume Forecast Consensus

The SBC LOCAL EXCHANGE companies Forecasting Organization will develop and maintain Wire Center construction data obtained from the F. W. Dodge database, DODGE DATALINE. Downloads are done monthly, or more frequently when needed. This data is supplemented locally from available sources, such as county construction permits and construction analysis vendors, i.e. American Metro Study. Business Facts come from the INFOMARK system, which provides business location information including Standardized Industrial Classifications (SIC) Codes that allow the development of customer profiles. In addition, locally available sources of economic data are obtained from such sources as Chambers of Commerce, state universities, banks, municipal and state governments. A common source is the SBC Economist which publishes monthly analysis of U.S. and state economic conditions and quarterly forecasts of key variables such as employment, housing starts, interest rates, and business indices.

The trending includes a market analysis including the changes in anticipated technology architectural shifts. It is anticipated that shifts will occur with regard to transmission delivery systems requiring frames such as DSX-1, DSX-3 and Fiber Distribution Frames (FDF) to support the higher bandwidth requirements and the conversion of existing services onto these new platforms.

Initial Forecast expectations were based on the number of service specific baseline products at the time of the request. Forecasts can be initiated or updated by three triggers:

1. Schedule Trigger. A forecaster may develop a schedule that allows for forecast updates to be spread throughout a year for a more effective mix for annual and semi-annual updates.

2. Deviations. If a forecast deviates by 15% of the actuals the forecast should be updated. If the aggregate for the market area deviates from the expected mean by more than 10%, WC forecasts should be revised.

3. A Specific Request. If a Planner requests an update to the forecast, it should be performed on a real time basis; if the size or level of activity warrants, the forecast should be updated six months later in keeping with the Forecast Process Procedures.

The minimum and required forecast intervals to be used are covered in the *Wire Center Planning Method & Procedures,* SBC-002-316-101 as follows:

- A minimum of every 3 years is mandatory. (Calendar Year, CY+1, CY+2)
- It is recommended to perform a 5-year frame forecast.
- A 10-year forecast needs to be performed for building exhaust situations.

Based upon the data received, the appropriate engineer/planner will evaluate the amount of service load and equipment necessary to meet service needs. These groups will translate the demand of equipment into the amount of bays or frame lineup lengths necessary to meet those objectives and forecasts. Three typical examples:

1. The Wire Center forecasts the placement of five OC-192 Network Element systems within the next six months. The TEE determines that the Primary FDF has sufficient bays for the NE and OSP terminations, but the NE Relay Racks will be placed on another floor. Evaluate the route of egress from the NE to the primary FDF. Provision Fiber Raceways on both floors in a 12" wide capacity using diverse routing. Also, plan on the use of a Satellite FDF on the other floor.

2. The Equipment Engineer (TEE) has received a forecast for 700 Fiber Rings (to twelve Central Offices using a new 144 fiber cable to each location) and 400 Network Elements in Optical Carrier Primary and Protect in OC48 and OC192. Based upon the existing Fiber Distribution Frame layout topology and using the 72 port per panel arrangements, the following is calculated:

   The outside plant cable will be terminated in 144 fibers per cable using two 72 port panels. Cabling will go to twelve other Central Offices, 144 fibers to each location. Therefore we will need 24 panels for OSP. The 400 Network Elements will require 800 fiber leads that can be placed in 12 FOT 72 port panels. The OSP and FOT panels are in alternating bays, 8 panels per bay.

   Check to see if there is existing capacity within the existing bays for these additional panels. For this exercise, assume the existing FDF is exhausted.
   Result: Need 3 bays of OSP and 2 bays of FOT. Since the bays are alternating, we will require the largest number for both FOT and OSP bays. The request will show a need for 3 OSP + 3 FOT panels for a total of 6 FDF bays.

3. The Equipment Engineer has received notification that several DWDM systems and BPON FTTH/FTTB will be deployed in the existing Central Office within the next 12 months. The site currently has 5 bays of Generation II (LGX) panels with the remaining capacity of 8 vacant OSP slots and one vacant FOT slot for panels. The forecasted demand will require 720 FOT terminations and 1440 OSP terminations.

   Plan: Cap the existing Generation II (LGX) frame (no new bays). Fill up the remaining slots in the LGX frame for OSP and FOT panels. This will leave you with a need to terminate 12 OSP panels and 9 FOT panels in the new lineup.

   First choice, use Fiber Optic Bridges between Generation II and III lineups. If the distance between the two is significant, use tie panels, expected 10 for first deployment. With Bridges, tie panels will not be needed.

   Place 4 bays of Generation III FDF, 2 OSP and 1 FOT bay and one MISC bay. Reserve space for additional bays per the Space Planning Guidelines. Load FOT and OSP panels from the bottom of each bay up. Load Tie Panels (if needed) in all bays from the top down.

When incremental growth forecasts are the only option due to regulatory limitations, great care should be exercised to keep the frame from prematurely exhausting. The forecast intervals need to be compressed to compensate for frames with less capacity than normal, which could be exhausted due to small surges in growth. Due diligence is necessary in the planning, use and mechanization, to preclude a premature exhaust. Some typical items are listed below:

Less than optimum placement of FOT/OSP panels that will cause long jumpers or convoluted cable routing. This may prematurely trigger the need for a new frame at a substantially increased cost over the ability to expand the existing frame structure.

Fiber Jumper Routing blockage can develop between old and new adjoining frame areas unless great attention to detail is exercised in cable management by performing cable rearrangements and disconnect orders on a regular basis, within one week of the date of the Service Order.

It is absolutely critical that the Equipment Engineer (TEE/FEE/DTE) and the Outside Plant Engineer maintain documented records on initial and growth FDF decisions. The documentation needs to include the reasons for the placement/growth, the date/time group and the backup documentation from the forecast organization (or Fundamental Planners). This information will support the reasons as evidence in Regulatory Inquiries. Insure that the documentation will stand on its own merit and it is written in a non-technical format.

12. Records Assignments

12A. OSMINE Records Assignments

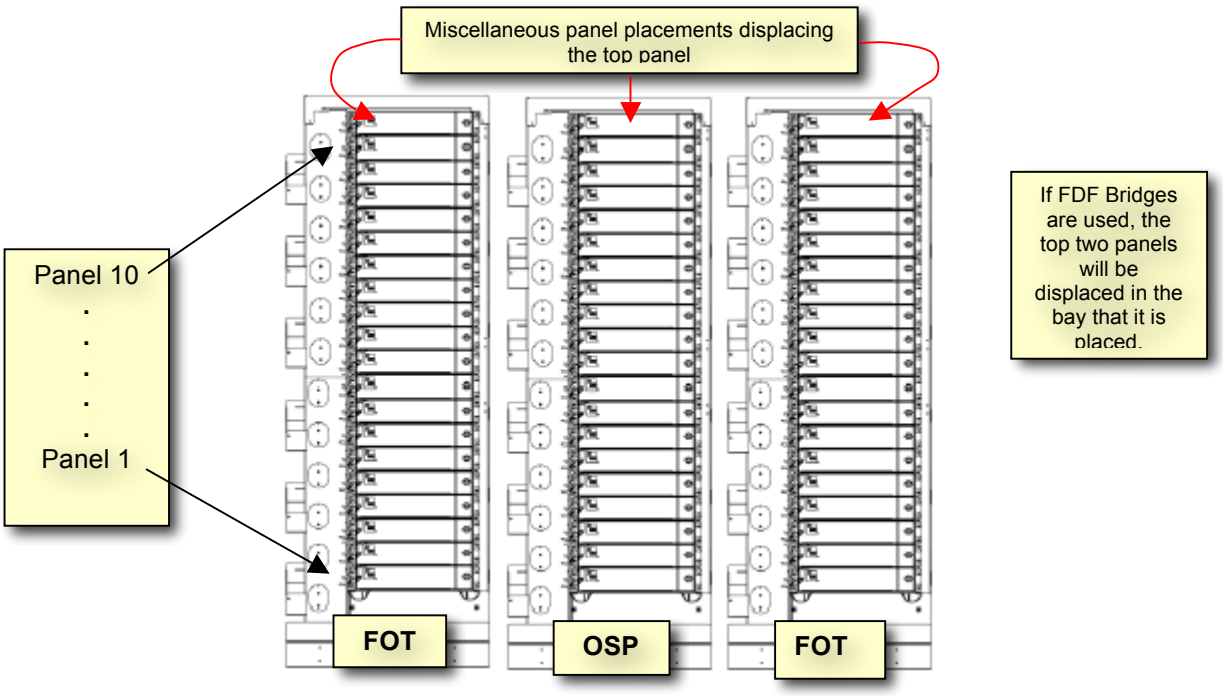
Per Telcordia Technologies GR-449-CORE, *Fiber Distribution Frames*, R3-66 [243] Issue 2, dated Jan 2003, the FDF and the panel/blocks will be OSMINE compliant with Telcordia Technologies document BR 751-100-790, Issue 6, Nov 1992, Table B, Format T. Each manufacturer shall file documentation with Telcordia Technologies and meet COMMON LANGUAGE Distributing Frame Cross-Connect Point Codes.

This requirement refers to adding FRAME DATA (Bay, Panel/Block/Tray, Row, and Port) on the network elements terminating on the distribution frame. The distribution frame itself is not inventoried in TIRKS but the Network Equipment and cable assignments that terminate to the FDF are loaded. The Frame data appears on the inventoried equipment (Network Equipment such as Add-Drop Multiplexers) that indicates where the equipment is cabled.

The OSMINE (Operations Systems Modifications for Integration of Network Elements) process is applicable to network elements under software control, and as such, FDF does not come under the OSMINE scope. However, as the requirement R3-66 correctly describes, you will need to acquire the FDF Cross-Connect Point Codes.

12A.1. Generation I & II Frame Types

Frames that use horizontal panels will use a sequential whole numerical count from the bottom of each bay beginning with the number 1. In addition, OSMINE Port counting within each horizontal panel will count in numerical sequential numbered count (Standard Telco Provisioning) beginning with the top left connector as seen from the front. The sequential count will be additive downward to the bottom of the row followed in sequence at the top of the next row until the end of the panel. The bays will alternate with Equipment terminations called the Fiber Optic Terminal (FOT) with Outside Plant (OSP) with the top panel space being left for the placement of a Miscellaneous panel or tie panels. See illustration on next page:



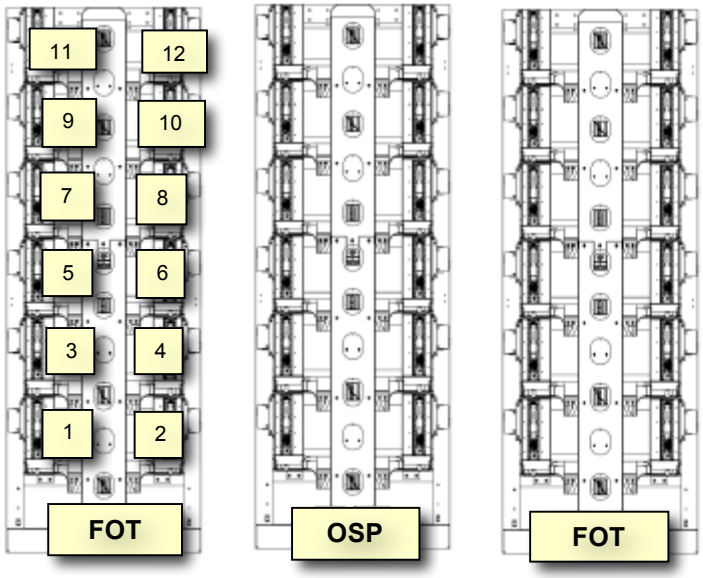
12A.2. Embedded NGF Frames (SBC-Midwest only) {Discontinued Arrangement}

The NGF uses clusters of connectors along two parallel vertical uprights in the bays will be numbered in a sequential whole numerical count beginning with the bottom left, then bottom right, then next above the bottom left, and so on. Each manufacturer will be required to complete OSMINE facility layer for this product type. Numerical sequential numbered count beginning with the top left connector as seen from the front. The sequential count will be additive on the same horizontal row to the end, returning to the next row starting directly below the first port on the panel. The count will continue across by each row until the end of the panel and then move to the next level to the left side. The bays will alternate with Equipment terminations called Fiber Optic Terminal (FOT) with Outside Plant (OSP). The use of a Miscellaneous panel will require the use of a Generation II or a Generation III (NG3) bay, the horizontal panel will not work within the NGF frame arrangement. A transition component will be required between the NGF and the NG3 when there is a change in the bay types in the same lineup.

On a going-forward basis, the NGF frame will be capped at the bay. This means that the very next bay to be installed will be the Generation III (NG3) Frame. The existing NGF bay will have the clusters placed to finish all the NGF bays but will use the layout assignments on a going-forward basis starting with the very next cluster. The top two cluster blocks may be used for tie panels in any NGF bay. New bays (NG3) will use the new NG3 panels in lieu of the cluster blocks. See illustration.

Miscellaneous Panels will not fit in the NGF frame due to the central feed for Fiber Jumpers. The placement of another frame (Generation III NG3 Frame is preferred).

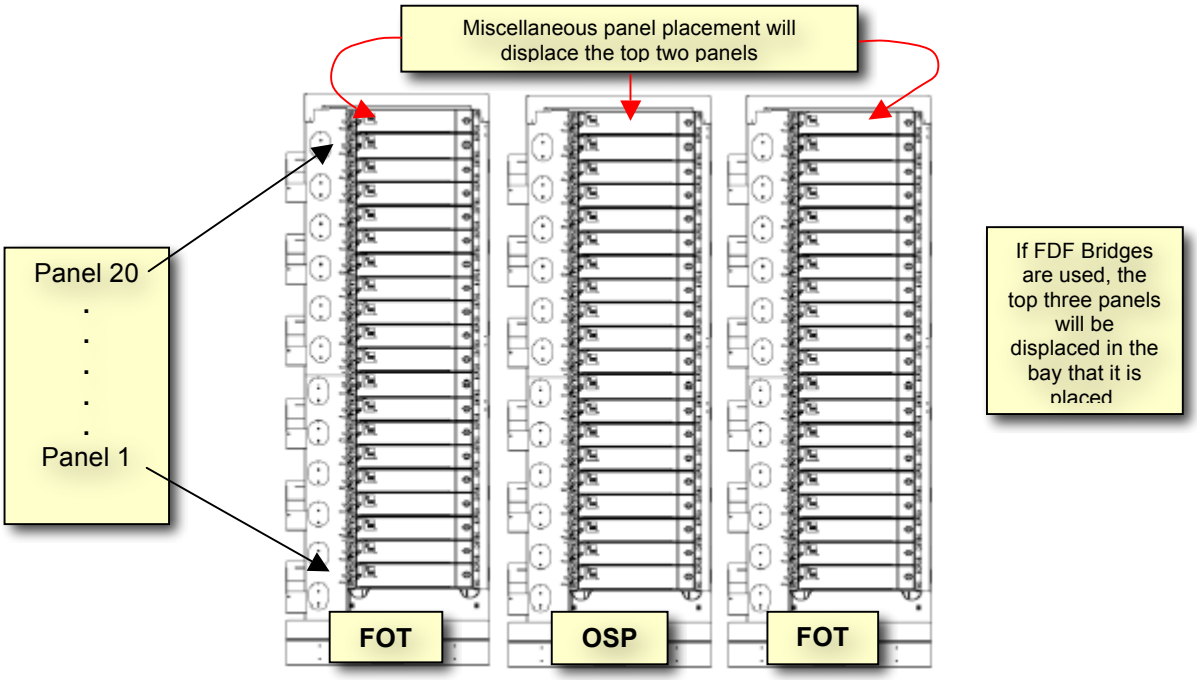
Cluster blocks of 72-ports are placed in this sequence with the top two being used as an alternate for tie panels



FDF Bridges are not suitable for use on the NGF style of FDF. Recommend that a NG3 bay be augmented to the existing NGF lineup to permit this feature's full

12A.3. Generation III (NG3) Frames

Frames that use horizontal panels will use a sequential whole numerical count from the bottom of each bay beginning with the number 1. In addition, OSMINE Port counting within each horizontal panel will count in numerical sequential numbered count (Standard Telco Provisioning) beginning with the top left connector as seen from the front. The sequential count will be additive downward to the bottom of the row followed in sequence at the top of the next row until the end of the panel. The bays will alternate with Equipment called Fiber Optic Terminal (FOT) with Outside Plant (OSP) with the top panel space being left for the placement of a Miscellaneous panel or tie panel. See illustration.

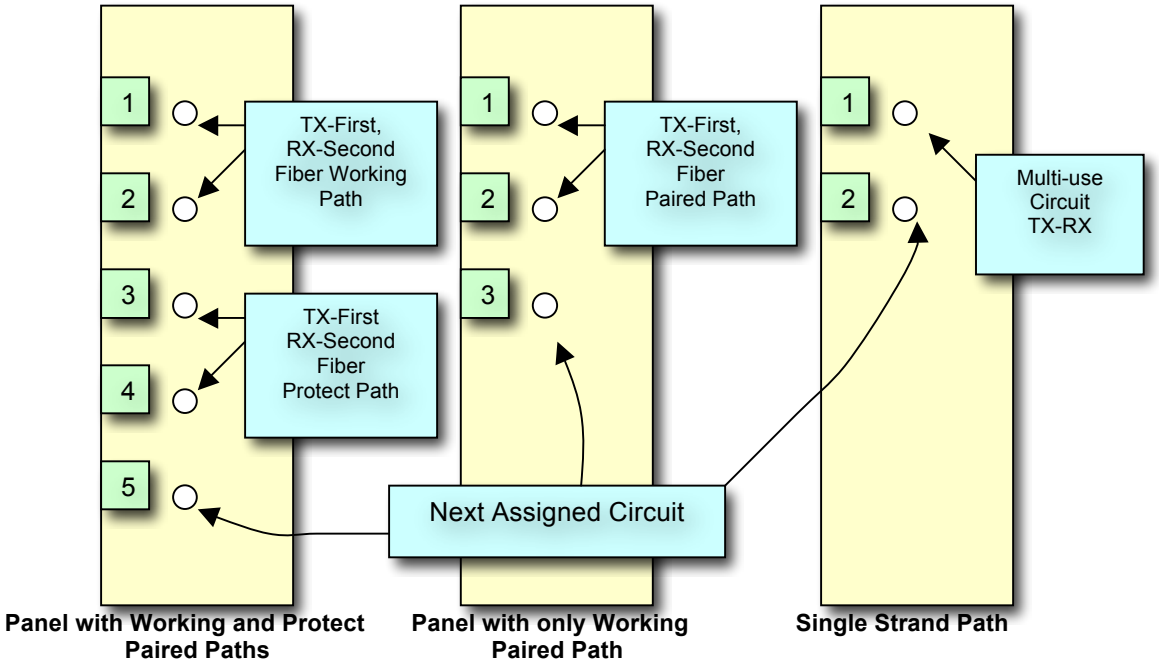


12B. Fiber Terminations on Panels

Fiber Distributing Frames will have Fiber strands terminated within the assigned panels in a sequential count starting with the first, or lowest strand number and increasing sequentially based upon the panel design. Typically panels are provided in 72-port grouping or clusters for the termination of fiber optic strands.

Rules for assignments of fiber strands follow the transmit and receiving addresses. This follows the standard convention of assignments for Circuit Provisioning Centers (CPC). When fiber paths are provided in pairs, the first strand will represent the transmit signal from the first address that is transmitting. The second strand represents the receive signal route to the second address that is receiving this signal. The first strand will be identified using the nomenclature (TX) with the second being identified as the (RX). This convention may be reversed on certain equipment terminations with specific SBC Equipment Drawings noting this as an exception to standard policy.

The working path will be identified as the first pair of strands. The second pair using the same sequence of TX & RX will be the protect path. When both working and protect paths are terminated on the same FOT panel, the sequence would be installed in the sequence shown in the first box below. The second box demonstrates the placement of only the working or protect path by itself. The third box demonstrates the use of a multi-use fiber optic strand that provides both the transmit and the receive signals on the same fiber optic strand. In this case, the strand will be identified using the nomenclature of (TX-RX). Typically this type of signal is used in a working configuration only without a protect path. The next circuit will be assigned on the very next fiber optic strand without skips. For instance, a fully protected circuit with paired paths (the normal arrangement) would use port/strands 1-4 on the panel. The next port/strand would be assigned to the next circuit.



12C. TAB/db

The Tabular Database (TAB/db) is the inventory management tool for all FDF, panel and port assignments by type for SBC Central Offices. The orientation is to provide support to the Equipment Engineer (NP&E) groups for provisioning of bays and panels. The TAB/db inventory system is being enhanced to cover the dedication of cable assignments on FDF panels. TAB/db will not provide Circuit Level assignment reference points or jumper cross-connect routes. TAB/db offers numerous training sessions on the use of the system, refer to the SBC LOCAL EXCHANGE companies Web Site: http://woodduck/tab_training.htm

The Equipment Engineer may begin in 2 ways after creating spec to work in:

- Locate panel which requires connector type changes (if list of panels is available)
- Query the system for Fiber assignments and check each panel returned by the query for updates.

1. Create a Record Only spec by using A7x if the internal to SBC or V7x if a vendor (where x = the next available number from 0-9).
2. Once the assignment chart is located select the 1st line to be changed.
3. Click in the connector type field to activate the drop-down menu and select the appropriate connector type (repeat for front and rear if both are required). **THIS IS A REQUIREMENT FOR BOTH FRONT AND REAR FOR ANGLED CONNECTORS.**
4. Once the changes are complete click save.
5. Once the changes are saved select copy special from the edit menu.
6. Select the next position that needs to be changed and select remove from the status menu.
7. Select the number of assignments to remove by using the shift key for contiguous positions and the control key for noncontiguous positions**. (Note: be sure they are all assigned to the same network element.)**
8. Then click OK to remove them.
9. Select paste multiple from the edit menu.
10. Select the number of assignments to paste by using the shift key for contiguous positions and the control key for noncontiguous positions. **(Note: be sure they are all assigned to the same network element.)**
11. Then click OK to paste them with the new connector type.

TAB/db uses a series of drop-down menus to properly populate the port assignments.

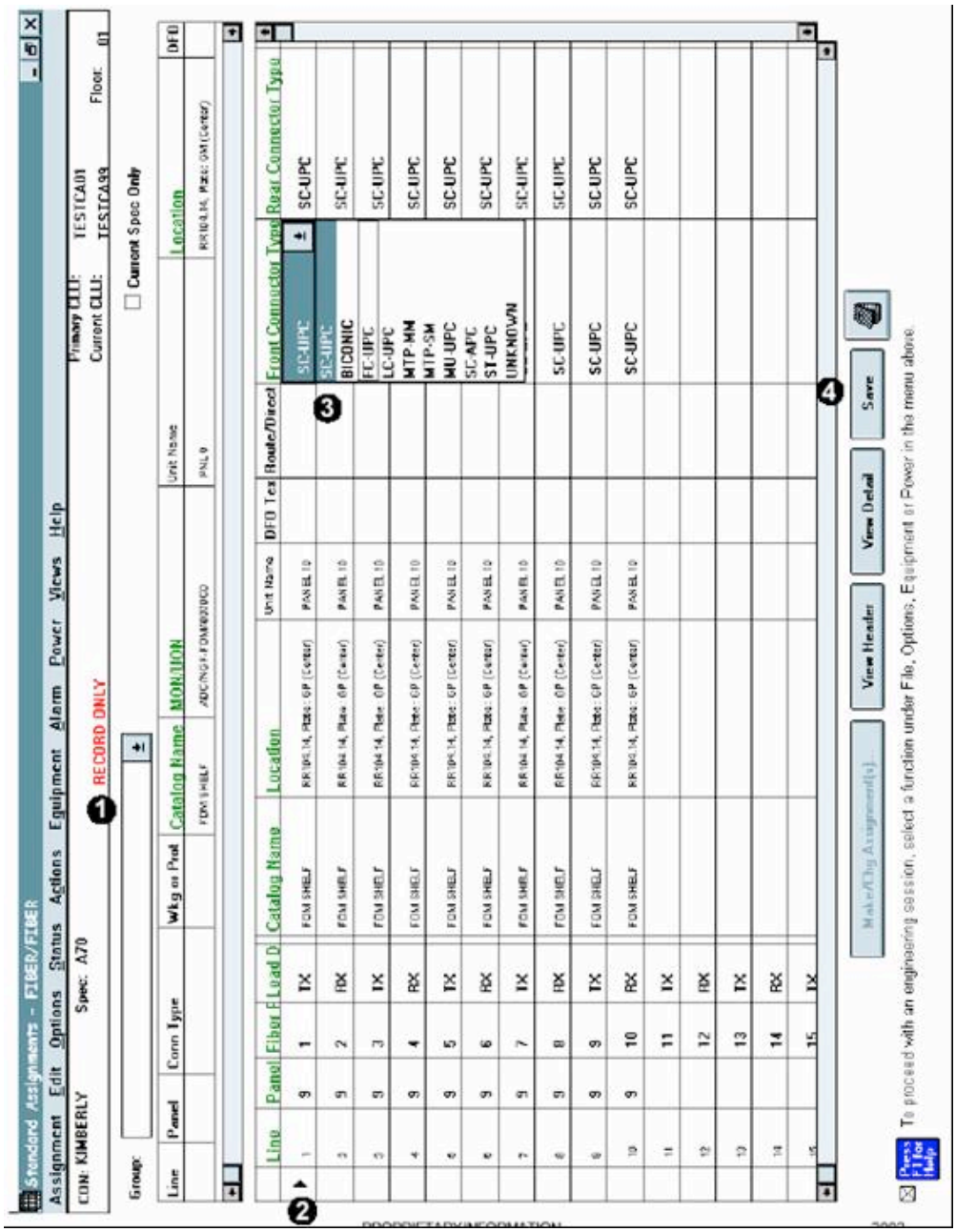


Illustration of a TAB/db screen used for FDF/panel and connector inputs.

12D. TIRKS

TIRKS assignments will be made based upon the serving location or the network equipment chosen for the network feed through the use of Cross-Connect Point Codes. Through the use of CLLI®, CLFI® and CLEI® codes established by Telcordia Technologies Inc., the assignments are made. The connector or mode type is not inventoried in TIRKS.

A visual inspection of the connector color will be required when the assignment is made. The connector and the sleeve housing will be green in color for SC-APC connectors, blue for SC-UPC connectors, gray for SC-UPC, MultiMode connectors. Other connector types do not use standard colors.

13. References

For further information or electronic copies of this document and related information, visit the internal SBC LOCAL EXCHANGE companies Web site: **http://ebiz.sbc.com/commonsystems** or **http://apex.sbc.com**. Drawings may be viewed on the SBC LOCAL EXCHANGE companies Web Site: **http://woodduck/standarddrawings/sbc/cbc-index.htm**

Document	Description	Issue & Date
SBC-002-200-992	SBC-OTA of Non-Approved Products	Issue 2, Jan 2003
SBC-002-216-074	SBC-Demarcation Policy for Access Services	Issue 2, June 2001
SBC-002-216-266	SBC-Turn-up and Test for FTTH	Issue 2, Nov 2002
SBC-002-316-011	SBC-SingleMode Fiber optic Splitters	Issue 3, Apr 2001
SBC-002-316-026	SBC-SingleMode Passive Wave Division Multiplexer (WDM) for the FDF M&P	Issue 3, Nov 2001
SBC-002-316-043	SBC-FDF Frame Deployment M&P Replaces AM-915-890-953 effective Dec 2001 Replaces AM IL 95-07-017 effective Dec 2001	Issue 6, Jul 2003
SBC-002-316-053	SBC-Fiber Raceway Deployment M&P	Issue 4, Feb 2003
SBC-002-316-066	SBC-Breakout Bay Deployment in Support of the NORTEL OPTera Connect DX System	Issue 2. May 2002
SBC-002-316-069	SBC-Fiber Optic Protection M&P	Issue 1, Feb 2003
SBC-002-316-072	SBC-BPON FTTH Common Systems Provisioning	Issue 1, Jan 2003
SBC-002-316-074	SBC-Fiber Optic Bridging for the FDF	Issue 1, Jun 2003
SBC-002-316-076	SBC-Telco Ethernet Architecture Standards	Issue 1, Mar 2003
SBC-002-316-077	SBC-Common Systems Standards (Internal Document)	Issue 1, May 2003
SBC-002-316-078	SBC-Fiber Connector/Mode Policy	Issue 2, Jan 2003
SBC-002-316-079	SBC-Fiber Connector/Mode Policy Addendum by Applied Services Approved for Use	Issue 2, Jan 2003
SBC-002-203-001 Section 13	SBC-Infrastructure Deployment Guidelines, Transport, Wavelength Division Multiplexing (WDM)	June 2003
SBC-002-203-001 Section 12	SBC-Infrastructure Deployment Guidelines, Transport, Fiber Optic Splitters	June 2003
SBC-002-203-001 Section 4	SBC-Infrastructure Deployment Guidelines, Transport, Fiber Distribution Frames (FDF)	June 2003
SBC-E-00136-E	SBC Fiber Patch cords, Cable and Attenuators	Current Issue
SBC-E-01140-E-01	SBC Fiber Distribution Frame Drawings	Current Issue
SBC-C-50001-E-00	SBC Fiber Raceway Drawings	Current Issue
SBC-E-01110-E	SBC Equipment Drawing for the Nortel OPTera Connect DX	Current Issue
SBC-E-01110-W	SBC Interconnection Drawing for the Nortel OPTera Connect DX	Current Issue
SBC-E-00136-E	SBC Fiber Cable Standards	Current Issue
SBC-TP76200	SBC-Network Equipment – Building Systems (NEBS)	Current Issue
SBC-TP76300	SBC-Installation Guide within the Central Office	Current Issue

SBC-TP76400	SBC-Detail Engineer Requirements for the C.O.	Current Issue
SBC-TP76412	SBC-Ethernet Standards for the Telco	Current Issue
SBC-TP76450	SBC-Common Systems Standards for the SBC Communications Network	Current Issue
SBC-TP76450-001	SBC-Common Systems Checklist	Current Issue
SBC-TP76450-002	SBC-Process Evaluation and Exception Request (PEER)	Current Issue
F2.1731.01.053	SBC-TRI-BPON FTTH System and Architectural Overview	Jun 2001
RFQ2001000147	SBC-RFQ for High Density-Fiber Distribution Frames	Nov 2001
SBC-PAN-2003-3162	SBC-Fiber Raceways (FiberGuide)	Feb 2003
SBC-PAN-2003-3161	SBC-Optical and Electrical Ethernet Products	Mar 2003
SBC-PAN-2003-3160	SBC-Passive Optic Protection for the FDF	Pending Jul 2003
SBC-PAN-2003-3149	SBC-Fiber Raceway (FiberGuide) Approval for Use	Feb 2003
SBC-PAN-2003-3148	SBC-Special Fiber Bay for Network Equipment	Jan 2003
SBC-PAN-2003-3146	SBC-Fiber Optic Bridge between FDF Lineups	Jun 2003
SBC-PAN-2003-3139	SBC-Destandardization of NGF FDF & Removal of PAN 20011120	Jan 2003
SBC-PAN-2003-3138	SBC-Generation III FDF Approval for Use	Apr 2003
SBC-PAN-2003-3137	SBC-Angled SC-APC Connectors and Panels	Jan 2003
SBC-PAN-2002-3001	SBC-Standard for Fiber Jumpers & Attenuators	June 2002
PAN 20021030	SBC-Fiber Breakout Bay Product Approval Notice for the Nortel OPTera Connect DX Platform	Apr 2002
PAN 20011120	SBC-AIT Restricted Approval for AIT only with Sunset Clause for FMDF	Dec 2001
PAN 20021012	Fiber Management Tray (FMT) for Outside Plant	June 2002
PAN 19995259.0002	FDF OSP Panels with Tails/Stubs Standards	June 2002
PAN 19995259.0001	FMT Panels for Central Office Use	June 2002
PAN 19995259	Frames (FDF) and Fiber Optic Apparatus	June 1999
PAN 19985043	Fiber Protection Systems (Raceways & Fiber Duct Work)	Aug 1998
BSP 800-003-150MP	SBC-Cable & Wire Installation for Cable Racks and (Fiber) Raceways	Issue 1, Sep 1998
SBC-NOTICE-000-000-606	SBC-Fiber optic Connector/Mode Standards	Issue 2, Jan 2003
SBC-NOT-000-000-516	SBC-Protective Cover for Existing Vertical Cable Guides	Issue 1, Aug 2002
SBC-NOT-000-000-473	SBC-Optical In-Line Attenuators for the FDF	Issue 1, June 2002
SBC-NOT-000-000-346	SBC-FMDF Restricted Use Approval with Sunset Clause Announcement	Dec 2001
FLASH-2001-015	SBC-Construction Support SC-ST Conv. in SWBT	Jun 2001
FLASH OSP-4/23/2002	SBC-Cleaner, Fiber Optic Connector Universal	Apr 2002
SO.520.99.043	TRI-Recommendation to Replace Biconic Connectors	Issue 1, Mar 1999
GR-449-CORE	Telcordia-Fiber Distribution Frames (FDF)	Issue 2, Jul 2003
ADC Drawing #1228576	ADC-Cable Manager, Vertical Cable Drawings	Issue A, Jul 2002
ADCP-90-295	ADC-NG3 HD-FDF System Rack Installation Manual: Raised Floor/Concrete Floor	Issue 1, Jan 2003
ADCP-90-296	ADC-NG3 HD-FDF Patch Cord & Routing Guide	Issue 1, Jan 2003
ADCP-90-297	ADC-NG3 HD-FDF 72-Position Hinged Termination Panel User Manual (Generation III)	Issue 2, Feb 2003
ADCP-90-298	ADC-NG3 HD-FDF User Manual (Generation III)	Issue 1, Jan 2003
ADCP-90-299	ADC-NG3 HD-FDF System Rack Installation Manual for Raised Floor and Concrete Floors	Issue 1, Jan 2003
ADCP-92-009	ADC-Glide Installation Manual (Generation III)	Issue A, Sep 2000
ADCP-92-016	ADC-Glide User Manual	Issue A, Jul 2002
ADCP-90-198	ADC-7-Inch FDF Application Guide & User Manual	Issue 6, Jan 2001
ADCP-90-325	ADC-Fiber Distribution Panel User Manual	Issue 1, Jul 2001
ADCP-90-329	ADC-Fiber Breakout Bay Cable Routing Guide	Issue 3, Apr 2002
ADCP-93-097	ADC-X-Aisle Trough System Planning & Installation Guide	Issue 1, May 2003
ADCP-95-007	ADC-FDF Interbay Cross-Connect Wiring Procedures	Issue 2, Jun 1999
ADC/Splitter & WDM Products	ADC-WDM Product Description	Issue 2, Jun 2001
ADC/AOFR	ADC-1310/1533/1557 Wavelength Division Mux/Demux	Issue 1, Aug 1996

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