

STREAMLINE CLOSETS WITH MODULAR CONNECTIVITY

By Dale Reed

Effective cable management for voice, data, and video (VDV) networks starts in the central telecom closet (or equipment room), – the line of demarcation, or point of presence (PoP), where the service provider's wiring ends and the user's begins.

Installers are seeing customers' telecom closets become congested as they add high data-rate VDV services, usually from multiple suppliers. The traditional solution is to provide multiple ports of a single cable interface at each PoP and for each service provider. Because cable lines are being added to a facility not originally designed to accept this variety of services and suppliers, neatness and orderly placement are sacrificed. From the end user's view, valuable working space is consumed in already-tight quarters, which complicates the accurate termination and routing of internal cables to network equipment.

One excellent solution to streamlining today's network handoffs is modular or "mix and match" media management, a single physical point of termination that can accept any combination of wireline media types. This approach gives cable installers and end-users more options for terminating and routing service, future-proofs against changes in interconnect standards, and enables upgrade of interconnect components to "carrier-class" reliability.

TODAY'S INBOUND WIRELINE VARIETY

Telephone companies' cabling for service levels up to T1 is Category-rated unshielded twisted pair (UTP) copper

wiring. For large campus and commercial building users that buy DS3 service, copper coax or fiber optic cable is used to transport the signals from the central office to the premises equipment room. For even higher data rates, fiber cables are multiplexed into multiples of DS3 line rates for further "transport" assignments.

For cable operators, the cables to the premises is generally coaxial cable, terminated with bare-wire center conductor F connectors and connected to a premises headend, which is both the

PoP and a passive signal distribution point via splitters.

Satellite-delivered voice, data, audio, and video, as well as terrestrial wireless, are generally connected to internal networks via coax F connectors to an RF distribution amplifier/splitter.

EXTERNAL CHANGES

Inbound cabling management will get more complicated as competition to deliver VDV intensifies between telephone companies, multiple-system cable operators, and co-located IP ser-

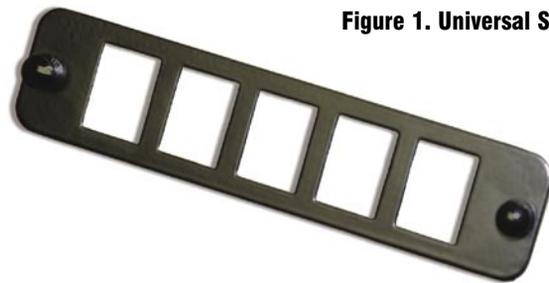


Figure 1. Universal Subpanel



Figure 2. Interchangeable Modules

vice providers. There's also technology competition to contend with, as fiber to the premise (FTTx), Ethernet-in-the-first-mile (EFM), third-generation data-over-cable-service (DOCSIS 3), VDSL, and other DSx-based services from the telcos slug it out for supremacy.

The "last mile" infrastructure that connects the private networks to the public network core is currently a tremendous bandwidth bottleneck. The public network and most access networks support tens or hundreds of gigabits per second data rates, while the last mile interface runs at sub-megabit or kilobit rates. This is where all the efforts to increase bandwidth will take place in the foreseeable future.

To correct this mismatch, service providers are pushing network bandwidth out to the last-mile edge to enable more capacity. This "decentralization" is making premise connectivity a more important determinant of high data rate

performance in private networks than ever before.

The viable candidates right now for incoming "last mile" media are fiber to the premise, terminated via SC physical contact connectors (precise-alignment "butt joint" interconnect of fiber optic cables), Category 6 UTP terminated into RJ-45 connectors, and RG-6 coax terminated into either carrier-class BNC or F connectors.

Using "mix and match" media management hardware, installers improve the organization and efficiency of current inbound media and enable clutter-free new media additions and switchouts.

THREE LEVELS OF FLEXIBILITY

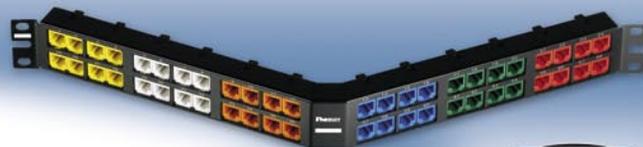
The first level of flexibility afforded by mix-and-match media management is the *universal subpanel* – the mounting mechanism that enables multiple demarcation modules for multiple cable/connector combinations to be

co-located in a single rack panel or distribution box.

The second level is the *interchangeable demarcation module* – the core of the mix-and-match approach. Currently, there are four types of interchangeable modules available. The first is a keystone-type, multi-connector panel that lets you co-mingle multiple industry-standard pass-through connectors in a single module (see Figure 1). Up to six different jack types can be combined on a single module – 75-ohm BNC, 50-ohm BNC, F, RJ-45, RCA, and SC (fiber optic). These keystone modules are easily re-configured to accept other types of connectors as end user needs dictate.

The interchangeable module design also enables commercial installers and end users to incorporate powerful demarcation tools previously available only to the telecom industry (see Figure 2). These "carrier class" demar-

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Angled Patch Panels facilitate proper bend radius of each cable as it is routed directly into a vertical cable manager eliminating the need for horizontal cable managers, which saves valuable rack space. The high density version supports 48 ports in 1 RU when used with vertical cable managers as compared to conventional cable management of 48 ports in 4 RU, using flat patch panels and horizontal cable managers.

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Figure 3. Distribution Panels

cation modules enable monitoring and evaluation of the signal at the handoff, and provide clear, traceable test points. Front-side monitor ports enable signal-to-noise and bit-error rate checks without interrupting signal flow, and allow quick determination of which side of the network service handoff is responsible for performance problems. Versions of these pass-through jacks with gas-tube protection are available for premise DS3 and digital video connectivity in campus/premise outside plant installations.

The third level of flexibility is the *distribution panel*. There are multiple options for mounting the modular subpanels, depending on the size of the telecom closet (see Figure 3). The most flexible and expandable distribution panel is the rack-mount system, consisting of 19" or 23" 1RU panels that hold four universal subpanels. The rack system is tremendously scalable and capable of substantially consolidating inbound wirelines for large building or campus wiring closets.

For smaller closets, double-lockable enclosures are available that accept up to four subpanel modules, providing up to 20 wireline connects. The double-lockable enclosure gives the service provider and the end user protected access

to their respective sides of the handoff. For small telecom closets a wall-mountable L-bracket is available that holds up to three universal subpanels.

VERSATILE AND FUTURE-PROOF INTERCONNECTS

Up to now, manufacturers of termination and distribution equipment have provided enclosures with fixed connector panels – just fine in an environment where you set it up once and never make changes. But in today's rapidly evolving VDV environment, the ability to accommodate new service types and incoming cables without having to rip and replace termination equipment is more attractive than ever before. This is where mix-and-match media management shines brightest.

For example, if an end user decides to switch from traditional voice service to VoIP, using a co-located IP service provider, all the service provider's installer has to do is add the appropriate module, terminate the inbound cables on the provider side of the handoff, and lock it up. This ease of accepting new service applies equally to fiber-to-the-premise, Ethernet-based service, and coaxial cables for DS3 high data rate service (44.5 Mbps) and digital cable systems delivering voice/data/video service.

Another versatile example is changing cable media to deliver an existing service. If an end user wants to switch from coax copper DS3 service to fiber-to-the-premise connectivity, the termination can be accomplished by simply switching out the existing demarcation module and replacing it with one that terminates and routes the fiber line to an internal optoelectronic device for distribution within the premise.

Implementing modular point-of-termination solutions is the easiest and surest way to give your customers the space savings and interconnect reliability they need today, and the flexibility to accept new types of service as it comes on line tomorrow. ■

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