IPTV Guide

Practical Deployment Strategies for Network Operators

IPTV.

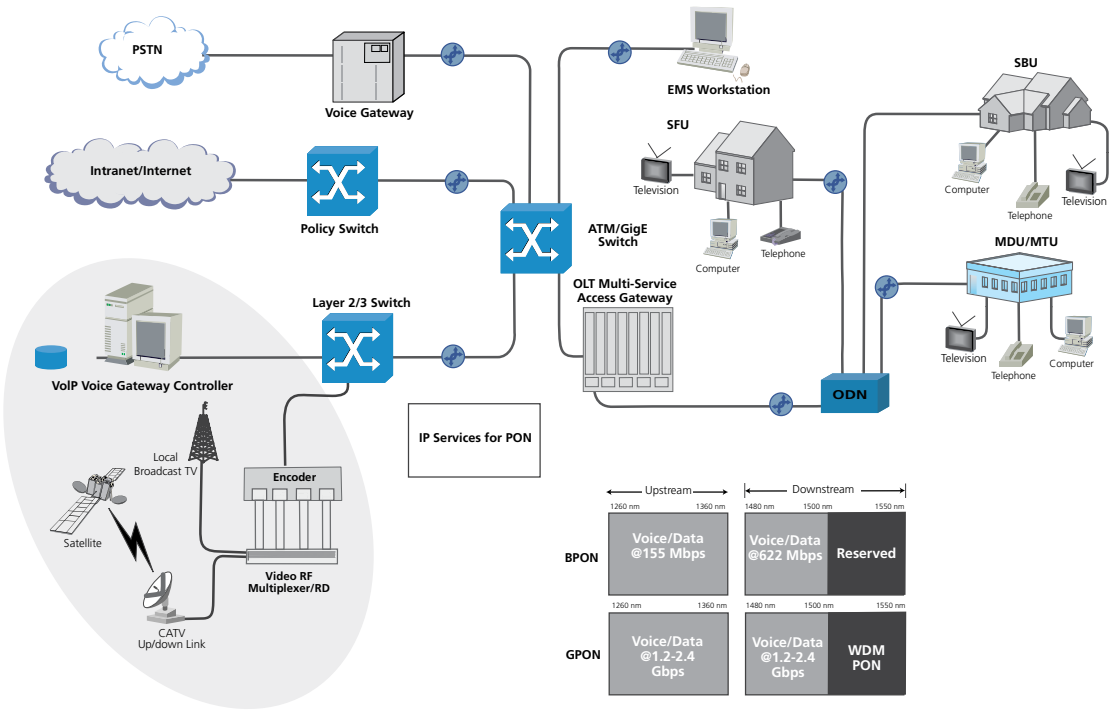
For many, the acronym conjures up visions of 100s of on-demand entertainment channels delivered anytime, anywhere. It promises total control by the user to customize their multimedia experience for true interactive unicasting. And for many operators, IPTV holds the allure of tapping into new revenue sources with the delivery of advanced multimedia services over broadband networks.

IPTV is being enabled by the transition from analog to digital video. Advances in video compression technologies are making it easier to deliver both standard- and high-definition audio and video. The growth in bandwidth, coupled with digital video and better compression, is enabling broadband delivery. And increased competition, along with consumer demand, is fuelling the fire.

So what's the best way to deploy IPTV? The answer is there's no one answer. Today, the basic delivery networks include Digital Subscriber Lines (DSL), Passive Optical Networks (PON), cable, or a combination of these. Each has its advantages and challenges.

Typical XDSL Development

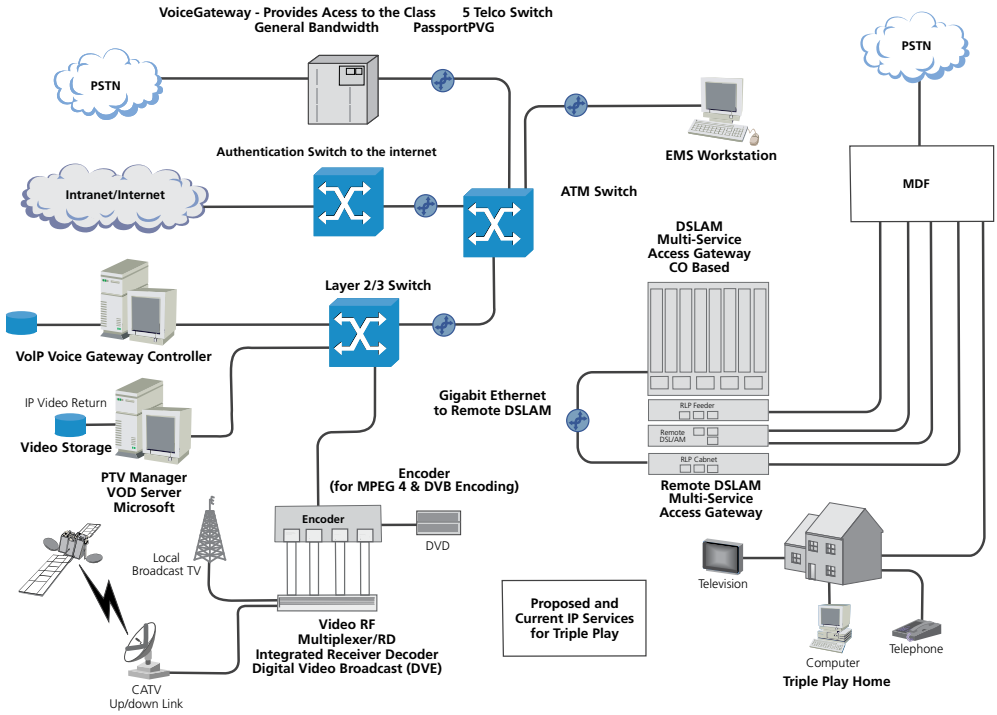
With current compression technologies, neither DSL nor asymmetrical DSL provide the bandwidth required for IPTV. Very high-speed DSL offers more bandwidth (up to 50 Mbps downstream), but the tradeoff is the distance. Subscribers need to be close to the CO or a remote terminal as the speed of the network decreases over longer distances. For many operators IPTV deployment over xDSL will remain attractive given current investments in the copper plant. One of the downsides is xDSL delivery of high-definition TV. HDTV currently requires 19.2 Mbps per channel compared to 2.5 Mbps for standard-definition TV. Channel changing requires a set-top box that sends a signal to a DSLAM, which may create some latency issues for HD programming even at top VDSL speeds.



Typical PON Development

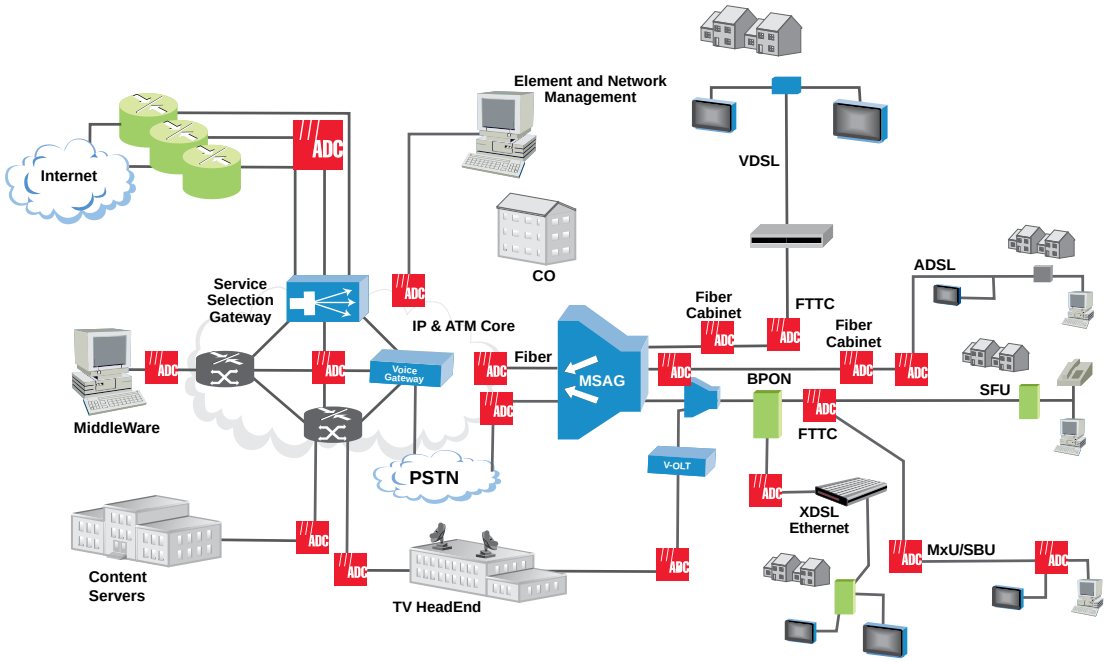
An all-optical alternative to xDSL, PON offers greater bandwidth at greater distances. Multiple customers can be served by a single fiber through the use of optical splitters, and unlike copper, fiber offers much greater flexibility by simply changing the wavelengths. Depending on the version of PON deployed, downstream data rates can range from 622 Mbps to 2.488 Gbps on a single fiber, with splitter ratios ranging from 1:4 to 1:32. A G-PON network delivering 2.488 Gbps with a splitter ratio of 1:32 can offer 77.75 Mbps per customer, making it more attractive for video delivery. But even with that kind of bandwidth, HDTV delivery remains problematic until advanced compression technologies are available.

With current capacity of 35-40 Mbps, cable offers another route for IPTV deployment through digital modulation for the data packets. And as operators move from DOCSIS 1.0 to DOCSIS 3.0, downstream speeds will increase from 38 Mbps for a single 256 QAM encoder to up to 600 Mbps for multi-QAM encoders.



Variations

The best paths to follow are as varied as the number of operators competing for the lead in IPTV. For some, a video overlay makes the most sense, while for others; switched digital video over Ethernet or G-PON networks will offer the best deployment strategy. But regardless of what path you choose, the transition to IP will require a flexible, scalable network infrastructure optimized to both reduce costs and provide the longest possible lifespan for the investment.



Helps Put the IP in IPTV

ADC can help you put the IP in IPTV, no matter which route you choose. With products ranging from IP core solutions to last-mile connectivity, RF signal management, HD-quality broadcast solutions, and professional service to help plan, deploy and build next-generation networks, ADC offers unique expertise in voice, video and high-speed data convergence that can help you deploy sensible solutions today with the flexibility needed to meet future demands.

ADC solutions for IPTV deployment include:

- Professional Services
- RF signal management
- Broadcast connectivity
- Fiber connectivity
- FTTX solutions
- Structured cabling solutions

Working with ADC on our IPTV initiatives offers real benefits for current and future deployments, including:

- Increased flexibility of the network
- Greater scalability to meet future service demand
- Improved quality through the use of market-leading product and service solutions
- Improved reliability to ensure the maximum return of your network investment
- Reduced time to market through faster deployment cycles, leading to improved time to revenue

Professional Services

ADC offers a full range of planning, deployment and maintenance services as well as expertise with network equipment and elements from more than 60 manufacturers. Our Professional Services teams offer a complete assessment service to help operators determine exactly what's needed for IPTV deployment, including engineering, furnishing and installation (EF&I); pre-configuration of rack level solutions incorporating products from leading network equipment manufacturers; commissioning and integration; and decommissioning and removals to optimize the plant.

We also provide turnkey program and project management to ensure a smooth process with on-time and on-budget delivery. Our multivendor, multiservice and multitechnology approach, coupled with our experience, differentiates ADC from its competitors and provides our customers with a powerful business advantage.

Planning Services

- Program and Project Management
- Network and Inventory Audit
- Engineering

Deployment Services

- Program and Project Management
- Engineering
- Material Services
- Preconfigured Equipment Solutions
- Power Services
- Installation Services
- Commissioning and Integration
- Provisioning
- Decommissioning and Removals

Maintenance Services

- Program and Project Management
- Service Call Center and Dispatch
- Technical Assistance Center
- Scheduled Preventive Maintenance
- Emergency Corrective Maintenance
- Field Resource Support
- Circuit Provisioning
- Service Call Center and Dispatch
- Logistic Services
- Spares Management

RF Signal Management Solutions

For many video delivery networks, the handover from the distribution network will involve the management of RF signaling from sources that include broadcast transmitters, satellite, receivers and off-air antennas. ADC's RF Worx® provides carrier-class RF combining, splitting, distribution and management within the super- and video-hub headend to facilitate transport over the IP network. ADC's RF Worx® SignalOn® series platform enables network reconfiguration and balancing without service interruption, and features patented "make-before-break" hitless attenuation technology.

ADC's RX Worx series provides the highest density in the industry (20/5RU) and the industry's best performance from 5 MHz to 1 GHz. It also exceeds NEBS requirements for grounding and bonding. Its reliability and performance offer lower operations costs as compared to other RF signal management products.

20-Position, 5RU Chassis

Broadcast Connectivity

For more than 50 years, ADC has led the market in audio, video and data patching solutions for broadcasting; having become the de facto gold standard for digital audio and digital video patching products. Nearly all the world's leading broadcast networks use ADC products to ensure reliability and performance for applications ranging from HD mobile production to post-production.

PPP1248-E90-HN with PPP-15-CHAS-KIT
EDAC 90-pin Chassis with 1.5 Designation Strips

The UniPatch® modular patching system with universal chassis allows you to combine data, audio, and video patching modules in a single two-rack-unit modular panel. Order a mix of jack and backplane modules to create a totally custom patching system, or order a preconfigured panel filled with bantam audio jacks, and GigE and RS-422 data jacks. You can start with only a few modules and add or change modules as needed. The universal chassis with mix-and-match jack and backplane modules provides the ultimate in flexibility.

The patented Pro Patch® Programmable modular system offers unprecedented reliability and flexibility in a convenient, space-saving size and lightweight package. Specifically engineered for every day use in demanding environments, the Pro Patch Programmable system is the only product in its class that passes stringent MIL-STD-202F standards for vibration and environmental requirements. Pro Patch Programmable series panels are available for both audio and video applications.

ADC's Optical Normal Through Panel is the latest addition to the Pro Patch line of broadcast patching products. This fiber panel is designed to provide patch by exception, normal-through functionality, similar to copper-based patch panels. Traditional fiber patch panels require a fiber jumper to be in place at all times. With the Optical Normal Through Panel, all fiber "Source" and "Destination" connections are on the rear of the panel, with a normal-through connection between the "Source" and "Destination" ports. For greater convenience and reliability, patch and monitoring capabilities are accessed on the front of the panel.

SHDC is a super-high-density patching system designed for AES audio, 5.1 and 7.1 audio applications where coax medium is preferred but space is critical. The 1.5 rack space panel features 4X48 coax ports (96 circuits) with a unique patent-pending switchable termination feature that allows the user to select or deselect a 75-Ohm termination function on each circuit pair. The normal-through system is also available in a straight-through option for tie-line panels and applications where normals are not required.

SHDC is rated for digital audio and SDI video up to 3 GHz, and features screwless mounting, and 10,000 insertions/withdrawals. The system features ADC's patented push-pull LCP connector technology on the backplane, making installation faster and easier than traditional BNC, F or other connector types. LCPs terminate just like a BNC using standard BNC tooling, making the transition easier than ever.

ADC's BNC connectors are the most reliable and universally accepted method of terminating coaxial cable in the market today. Outstanding electrical performance (up to 3 GHz) is achieved by unique design elements in the industry's truest 75-Ohm connector. Precision-molded insulators with locking gold-plated center conductors ensure true 75-Ohm characteristic impedance. Innovative features result in significant reduction of impedance mismatch throughout the network and improved transmission reliability in digital applications.

BNC Connectors

ADC's high-performance F connectors are designed for demanding digital applications where a high-quality, high-performance F connector is required. These connectors provide superior return loss (-30 dB to 3 GHZ) and are the perfect choice for use in digital headends, satellite down links, and high-performance customer premises applications.

The venerable RCA connector is still the universally accepted method of terminating coaxial cable for audio and video signals in Prosumer-type products such as video decks, DVDs, video projectors and HD monitors. ADC's new precision RCA connectors are designed for demanding professional environments, offering a performance-driven product with outstanding mechanical and electrical characteristics, as well as easy BNC-type assembly. Precision-molded insulators with locking gold plated center conductors ensure nominal 75-Ohm characteristic impedance. Innovative features such as ADC's proprietary geometrically molded insulator design result in a significant reduction of impedance mismatch and improved transmission reliability for digital applications. ADC's RCA connectors use the same strip and crimp tools as ADC BNC and F connector products, making installation easy and fast.

Video Patch Cords

ADC offers high-quality video patch cords capable of handling uncompressed high-definition digital video, serial digital video, and analog as well as AES audio. ADC patch cords feature a patented True 75-Ohm design that virtually eliminates bit errors, are made of the highest quality materials and provide excellent mechanical durability.

IP Core

The center of today's carrier networks is changing from circuit switching to packet switching. In order to offer new services such as VoIP, IPTV and high-speed data to consumers, the physical layer of the network must be migrated. ADC is uniquely qualified to help with this migration via our broad portfolio of copper, fiber, coaxial and wireless solutions.

ADC's products and services provide our customers with the confidence that the new IP-based services will be delivered on a carrier-class packet infrastructure, where six-sigma levels of reliability are required. For example, video is a key component of these new networks.

Fiber Connectivity

ADC family of Fiber Distribution Frame (FDF) products utilizes our expertise in cable management, and stresses both modularity and flexibility. The end result is a product family well suited for today's fiber network and capable of accommodating future growth.

ADC is a market-leading supplier and low-cost producer of fiber access, termination, and connectivity products designed to provide a full range of solutions for optical networks. Today's unprecedented growth and widespread deployment of fiber has made cable management a critical element for building robust and reliable networks. Able to grow from one fiber to thousands of fibers without sacrificing space, function or cable management protection, the FDF is a critical component of any IP network. Innovative fiber frames, clear routing paths, slack storage solutions, and optical components all optimize the value of your optical network.

The FDF cross-connect system uses a main distributing frame concept for establishing an office configuration that's likely to change periodically as the office expands or as service requirements change. Rearrangement of the CO is by means of cross-connect changes at the connector module. This added flexibility is an important consideration as fiber optic networks become more complex.

With more than 15 years of fiber-cable manufacturing experience, ADC offers a complete family of high-performance cable and related product. ADC also offers standards compliant cable for Cat 3, Cat 5, Cat 5e and Cat 6 applications as well as CopperTen™ for the emerging 10 Gbps Ethernet over UTP standard. ADC's high performance copper riser and plenum cable for highly automated manufacturing processes that ensure consistent quality and dependability with superior electrical performance produce backbone and horizontal applications. ADC's central office cables deliver the data bandwidth you need to eliminate throughput bottlenecks or downtime. The increased throughput potential translates to increased customer satisfaction. By combining high integrity design and application engineering services, ADC satisfies your network's physical layer requirements.

Next Generation Frames

Defining IP Multi-Media Convergence

Appliance	Service	Bandwidth
Television	High Definition TV	~19 Mbps
	Pay TV	3-6 Mbps
	Interactive TV	Differed
Personal Computer	Interactive TV on Internet	Up to 1 Mbps
	Video on Demand (VoD)	3-6 Mbps
	Personal Video Recorder	Up to 6 Mbps
	High Speed Internet	Up to 2 Mbps
	Interactive Gaming	Up to 1 Mbps
	Video on PC	Up to 1 Mbps
Telephone	Voice over IP (VoIP)	Non dedicated
	Voice over DSL (VoDSL)	40-64 kbps/ch

FTTX

ADC offers a complete range of infrastructure solutions to extend IP beyond the central office. In the CO, ADC's OmniReach® copper and fiber infrastructure products, raceways and high-performance connectors assure smooth integration of new equipment and technologies, as well as long-term reliability and flexibility critical in the central office. ADC also offers fiber-distribution terminals, PON splitter modules, connectors and drop cables, as well as solutions for high-performance interconnection of fiber cables and equipment at multiple dwelling units. These products include:

- Fiber distribution hubs
- Optical splitter modules
- Indoor drop cables
- Indoor fiber distribution hubs
- Indoor fiber distribution terminals
- Fiber demarcation cabinets
- Fiber demarcation boxes

OmniReach

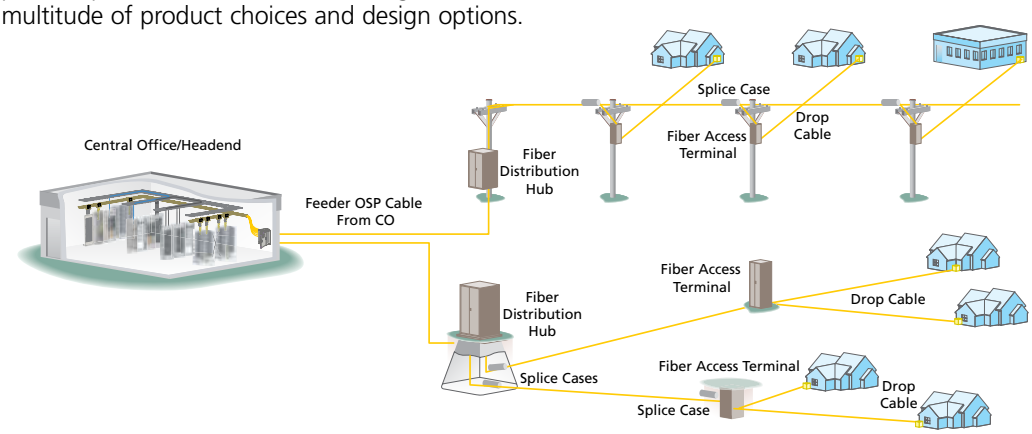
ADC's Fiber and Node Distribution Terminals will support both the FTTN as well as the FTTP architectural models. Both models offer superior cable management, and a single point for test and turn-up of customers enabling operators to further reduce operating expenses. ADC's access terminals for PON also provide additional significant cost savings.

Structured Cabling Solutions

TrueNet® is ADC's high-performance structured cabling solution, and is an integrated portfolio of industry-leading products from ADC and KRONE. The TrueNet system delivers proven cable, connectivity, and cable management solutions for fiber, augmented category 6, and category 6/5e from the data center to the desktop.

ADC's also offers Basic Category 5e and Category 6 Structured Cabling Systems as complete channel solutions offering 20-year product performance warranties along with a multitude of product choices and design options.

Regardless of which deployment strategy you chose, make sure the physical level can support current and future demands. ADC's end-to-end solutions for IPTV can help ensure a flexible, scalable network infrastructure optimized to reduce costs and network longevity.



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