Healthcare Technology Report

FutureFLEX Air-Blown Fiber Infrastructure Technology:

Creating the Low Cost, Patient Safe, Bandwidth On-Demand Network for Today's Hospital and Healthcare Facilities

By Chris Archer, Brinjac Engineering

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Introduction

The one constant with today's hospital-healthcare networks is IT change, as new demands are placed on the network and IT departments to respond quickly to the implementation of new high-bandwidth imaging equipment and services, wireless technologies, and the convergence of clinical, VOIP, and IT systems. Added to the myriad of new technologies implemented by IT is a host of automated systems — including electronic medical record (EMR), pharmacy, medical error reporting, and computerized IV pump systems — to improve patient safety in healthcare's concerted effort to save lives.

Facing new legislations in patient safety, uncertain network capacity and growth, and pressures to do more with less budget, IT network and facilities managers are essentially required to build a network responsive in real-time to the growing needs of the hospital/healthcare facility and patients, while contributing to patient safety, cutting costs, and delivering measurable return on investment (ROI).

As new high-bandwidth healthcare technologies are pushing the limits of data transmission and available capacity on the hospital-healthcare LAN (local area network), hospitals and healthcare facilities are keeping pace by upgrading, expanding, or reconfiguring their fiber optic infrastructure (structured cabling backbone) at a historically unprecedented pace. The fiber optic infrastructure, after all, is the transport medium and support system for all other network technologies, including the wireless network platform. With each network infrastructure add, move, or change, however, comes associated high costs and the risk of compromising patient safety. For this reason, healthcare network design guidelines mandate infection control measures and processes, enforcing risk mitigation standards in order to protect staff and patients. ICRA (Infectious Disease Control Risk Assessment) standards, published by the AIA, significantly impact network infrastructure installation, reconfiguration methods, and costs in healthcare's nationwide effort for managing risk and patient safety.

Although healthcare has witnessed advancements in every facet of technology, there have been no significant advancements in the underlying infrastructure technology in decades. Until recently, this infrastructure technology stagnation has contributed little to the evolving needs in healthcare for real-time access and control of bandwidth for faster delivery of emerging technologies, clinical flow processes and other IT projects; undisruptive methods for network upgrades, expansions, and reconfigurations; improved processes for infection control and patient safety; and cost saving procedures that generate continuous ROI.

Jolting infrastructure technology from its stagnation, a growing number of leading hospital/healthcare systems and facilities — including Mayo Clinic, NIH (National Institutes of Health), Central DuPage Hospital, Sharp HealthCare of San Diego, Penn State Hershey Health System, and others — have adopted the FutureFLEX® Air-blown Fiber® infrastructure by Sumitomo Electric Lightwave. By examining the components and installation methods of both traditional fiber optic and Air-blown Fiber infrastructures and comparing each to its contributions in advancing bandwidth and network capacity, compliance to ICRA and patient safety standards, and cost savings/ROI, network IT and facilities managers have the basis to evaluate these two infrastructure choices for their evolving healthcare network.

Definition & Installation Methods of Conventional vs. Air-blown Fiber Infrastructures

Conventional Fiber Optic Cabling Infrastructure

Both the benefits and limitations of a given network infrastructure are inherent results of the design of the fiber optic cabling products used and the method of installing the fiber between and within the buildings of a hospital/healthcare facility or campus. In a traditional fiber optic infrastructure, which has been the prevalent method of installing fiber for decades, fiber optic cable of varying ratings (i.e. indoor-outdoor, plenum, riser) is pulled in using Kellems grips and pulling ropes throughout the LAN to create the fiber backbone for the healthcare campus.

Conventional fiber optic cable contains optical fiber strands consisting of the core, cladding and coating that is contained in subunits (tight buffers/loose tubes/ribbon) that are protected by an outer jacket. The fiber and other subcomponents comprising the cable are an integrated whole. Therefore, the fiber is not a removable component of the cable.

Figure 1 –Conventional Fiber Optic Cable

The pulling of fiber optic cable is a labor-intensive process. For an outdoor application connecting various buildings within the campus, the fiber optic cable is pulled through innerduct within a conduit as a protective measure against friction and damage to the cable. This process requires multiple steps by requiring the installation of innerduct prior to the installation of the fiber optic cable. Conventional infrastructure methods also limit network capacity often leading to congested conduit. Within a typical 4-inch conduit, conventional cabling can provide a maximum of only four, 1-inch pathways, whereas the air-blown fiber system, as will be explained, accommodates two 1.7-inch, 19-tube cables for 38 re-useable pathways using less area in the same conduit space.

In most conventional indoor applications, the high cost of indoor-rated innerduct precludes its installation so that fiber optic cable is typically installed and supported by cable trays and/or J-hooks above access ceiling tiles.

Due to the inherent cabling design and labor-intensive fiber installation costs, the current conventional cabling infrastructure process forces the IT network manager to forecast patient and network growth, emerging technology needs, data traffic, and bandwidth requirements for the next 5 to 6 years to predetermine the type and amount of fiber to place. If the required fiber counts are underestimated and more bandwidth is needed, costly retrenching and disruption to hospital operations would result. Conversely, if too much fiber is laid, as is most often the case, the hospital or healthcare facility has spent valuable dollars for a needless and costly overbuild. Worse, as IT network and facility managers wrestle with what type of fiber to install, whether multimode, single-mode or laser optimized gigabit, the hospital or healthcare facility may lay soon-to-be obsolete fiber that would fail to support new medical technologies and the bandwidth requirements necessary to execute the hospital or healthcare facility's crucial IT projects. The traditional process of building the LAN backbone, therefore, paralyzes the network against change and requires investment of often unused dark fiber.

Moreover, needed Infrastructure upgrades, expansions, and reconfigurations with traditional network cabling methods are also labor and time intensive, add to recurring costs of the network and slow IT response time for speed and delivery of critical IT projects. Let us consider, for example, the needed implementation of a bandwidth-rich 64-slice CT scanner. To increase the bandwidth requirements for the scanner, a crew of technicians or installers must undergo the time consuming and costly process of preparing the area with ICRA suggested infection control measures (later explained in the ICRA-patient safety section) and slowly and carefully removing ceiling tiles to pull out the old fiber optic cable and install the new required fiber. This procedure requiring construction work causes not only increased risk for infection, but also disrupts the hospital or healthcare facility's daily operations, inconveniencing staff, patients, and visitors. The traditional methods for deploying any network move, add, or change makes it increasingly risky and difficult to safely make network infrastructure changes in clean rooms, sanitized environments, and immunocompromised areas.

The analysis of current conventional cabling infrastructures reveals the limitations of this decades-old technology for meeting the quickly evolving needs of the progressive hospital-healthcare network. A summary of limitations include:

- Life cycle, bandwidth, and network capacity of the conventional infrastructure is limited to the "forecasted, " not real, current needs of the hospital or healthcare facility, thereby impeding real-time network changes
- Predetermined type and amount of fiber requires investment of today's capital for tomorrow's unforeseen IT projects
- Lack of network scalability
- Network upgrades, expansions, and reconfigurations are costly, labor intensive, and time consuming, slowing IT response time for speed and delivery of new healthcare technologies and other departmental and clinical needs
- Difficulty making quick, easy, non-obtrusive, and patient-safe network adds, moves, or changes in limited access, secure, or highly sanitized clinical areas
- Disruption to patients, facility, and hospital-healthcare daily operations with infrastructure reconfigurations, upgrades, and expansions, often requiring network downtime
- Constrained network capacity for future growth
- Recurring costs with each network infrastructure change, resulting in zero ROI
- Costly and time consuming infectious disease control and patient-safety preparation

Air-blown Fiber LAN Infrastructure

Although FutureFLEX Air-blown Fiber has recently emerged in healthcare as an infrastructure addressing and resolving the limitations of conventional fiber optic cabling systems, it has been well-entrenched in other vertical industries with installations in the Pentagon, Department of Homeland Security, CNN, ESPN, Johns Hopkins University, Arizona Cardinals' (University of Arizona) Stadium – Home of the 2008 Super Bowl, and others. FutureFLEX, also, has been recently chosen as the infrastructure for NASA's new Constellation Space Program.

The design of the Air-blown Fiber system differs from that of conventional fiber optic cable in that the optical fiber, bundled in a PEF (polyethylene extruded foam jacket), is a separate component from the various indoor-outdoor, riser, and plenum rated tubes (see figure 2).

Figure 2 – FutureFLEX Fiber Bundles and Tubes

The tube cables hold up to 19 small individual tubes within a tough, outer jacket that has properties negating the need for innerduct. The tubes remain empty and are installed throughout the hospital or health care facility's local area network between and within buildings comprising the campus for a point-to-point, continuous and splice-free fiber run. From a fiber termination unit (FTU) located in an MDF (main distribution frame), data hub or telecom room, the empty tube cable leads to various tube distribution units (TDUs) within the campus that ultimately lead to and terminate at multiple communication centers within each building. The Air-blown Fiber system is easily integrated within an existing conventional infrastructure, utilizing the same traditional termination methods. The initial installation of the FutureFLEX tube infrastructure is the only occurrence in which construction work and trenching is necessary.

Through the empty tube cable infrastructure, any type and amount of fiber can be quickly and easily blown in and out at speeds of up to 150 ft. per minute anywhere in the network on an as needed basis, giving network and facility managers immediate control of bandwidth, network capacity, and budget. Recall that in the same conduit space in which conventional cable yields only 4 pathways, two 19 air-blown fiber tube cables yield 38 pathways, providing nearly limitless network capacity. To accommodate future network expansion, a number of the small individual tubes are left vacant through which fiber bundles can later be blown once the needs of the hospital or healthcare facility can be fully and accurately determined, giving network managers the flexibility to budget and plan one project at a time.

Eliminating the need for forecasting future network requirements and the expense of laying dark fiber, the FutureFLEX Air-blown Fiber process creates an on-demand network infrastructure responsive to the needs of the hospital-healthcare facility in real-time. Unlike the conventional fiber optic backbone, which has a limited life cycle based upon the predetermined type and amount of fiber dictating bandwidth capacity, the Air-blown Fiber system's ability to blow in and then blow out fiber (and reuse) on a project to project basis empowers the hospital-healthcare network with a continuously renewable infrastructure.

Since network upgrades, expansions, and reconfigurations are deployed through fiber termination and fiber distribution units, network changes typically require only two installers executing the project at a fraction of the time and cost associated with a conventional infrastructure, thereby generating continuous cost savings and the fast delivery and project turnaround necessary for a most efficient and responsive network.

To illustrate, let us revisit the example of implementing a high-bandwidth 64-slice CT scanner. With the Air-blown Fiber system, it is unnecessary for technicians to enter the location of the upgrade site, as is the process with the conventional cabling solution, consequently eliminating any disruption to the healthcare staff and their work flow. By eliminating any need to enter floors, ceilings, or walls to replace fiber optic cable with a different type to accommodate the bandwidth requirements of the scanner, the air-blown fiber process ensures an environmentally clean upgrade bypassing time consuming and costly infection disease control procedures necessary prior to replacing the fiber.

Rather than having to be physically at the site of the upgrade area, a technician makes the fiber upgrade from a telecom room where the fiber termination unit is located. For purposes of this illustration, let us assume that 50 micron multimode fiber needs to be replaced with single-mode or laser optimized 10 gig fiber. Utilizing the blowing equipment (see figure 3) — which includes compressed air or nitrogen, a blowing head, and a fiber reel of any fiber type available in 2-24 strands— the technician quickly and easily blows in the higher-bandwidth single-mode or gigabit fiber to the upgrade site and can, as easily, blow out the old multimode fiber undamaged.

Figure 3 – FutureFLEX Blowing Equipment

Another technician at the end-point of the fiber run terminates the fiber within his fiber termination unit. As an added value, the multimode fiber blown out can be reused in another network application, preserving the hospital-healthcare facility's fiber investment. It's as simple as that... with an Air-blown Fiber upgrade taking minutes rather than many hours or days as is the case with conventional cabling methods.

Overcoming and resolving the limitations of conventional fiber optic structured cabling systems, in summary, Sumitomo's FutureFLEX Air-blown Fiber has advanced infrastructure technology by providing the following attributes:

- Creation of an On-Demand infrastructure for fast & easy turnaround of network changes in Real-Time—even in clean rooms and ALL sterile areas … for quicker response & delivery time in meeting critical Hospital-Healthcare needs
- No disruption to staff, patients, and daily operations of the hospital-healthcare facility
- Elimination of forecasting network requirements and the investment of dark fiber
- Immediately scalable
- Provision of Bandwidth-on-Demand for quick & easy implementation of emerging medical technologies and new clinical processes
- Real-Time control of bandwidth, capacity, and budget
- Significant cost and times savings for network upgrades, expansions, and reconfiguration, generating continuous ROI
- Empowerment of the network with a continuously renewable infrastructure
- Protection against network obsolescence allowing the network to evolve in Real-Time with the evolution of healthcare
- Project turnaround time reduced from days or weeks to hours or minutes
- Environmentally clean network infrastructure for infection control and patient safety

If there were only one attribute or reason for adopting the Air-blown Fiber infrastructure, it is the fact that this technology offers the unique value of ensuring patient-safe network changes, contributing to healthcare's goal of controlling infectious disease and saving lives.

ICRA Standard Compliance for Infectious Disease Control

The Center for Disease Control estimates that more than 90,000 people die each year from hospital-acquired infections that are transported through ventilation systems. Potentially toxic mold spores may lie dormant above ceiling tiles or in walls until disturbed, representing a direct threat to immune deficient patients and to highly sanitized and intensive care areas. Financial costs associated with hospital acquired infections have risen to 27.5 billion in additional healthcare expenses annually. [1] Moreover, CMS Mandate: Section 5001 (c) of the Deficit Reduction Act cites that Medicare will no longer pay for hospital acquired infections.

Understandably, architects, engineers, construction managers, contractors and healthcare facilities and network managers have adopted and enforce ICRA (Infectious Control Risk Assessment) standards that are used during new construction, renovation and small projects. Also, many hospitals and healthcare facilities have staff dedicated to infectious disease risk assessment on a full time basis. JCAHO requires documentation of ICRA, while the Association for Professionals in Infection Control and Epidemiology (APIC) and the American

Society for Healthcare Engineering (ASHE) heavily promote ICRA as essential to healthcare's nationwide effort for managing risk, costs, and patient safety.

The AIA guidelines that pertain to ICRA include standards to protect both patients and staff, particularly from airborne contaminants and opportunistic pathogens, such as Aspergillus that may result in lethal infections. Any kind of debris or dust associated with the construction in hospitals — removal of tiles and flooring, breaking through ceilings and walls, installing ductwork or making any network infrastructure expansions, upgrades or reconfigurations represents a direct threat to immune deficient patients and to highly sanitized areas, clinical laboratories, intensive care units and clean rooms.

Therefore, time consuming and costly infectious control procedures are seriously observed in preparation for any network infrastructure add, move, or change. Some of these procedures promoted by ICRA and a state's Office of Statewide Health Planning and Development (OSHPD) include:

- Removing patients from their rooms
- Utilizing HEPA filter units
- Accommodating work crews with special protective clothing
- Specially training workers on infectious disease control procedures
- Involving the hospital-healthcare infectious disease officer in the monitoring of the infection-control plan
- Thoroughly cleaning the area in which the infrastructure upgrade, reconfiguration, or expansion will take place
- And…construct plastic enclosures, called NAPEs, for further protection

The cost of the infectious disease control preparation is generally 30-40% of the total cost of an IT network infrastructure change project.

It is crucial at this point to mention that with the FutureFLEX Air-blown Fiber system, these infectious disease control measures need only be done once…during the initial installation of the tube cable. Conventional cabling systems must undergo the infectious disease preparation procedure initially when pulling the fiber optic cable and subsequently with each network expansion, reconfiguration, or upgrade project.

Because the Air-blown Fiber system utilizes the behind the scenes fiber termination units for upgrades and expansions and tube distribution units for network reconfigurations, air-blown fiber provides construction-free deployments, eliminating the need for infectious disease processes, speeding up delivery of the project while ensuring patient and staff safety.

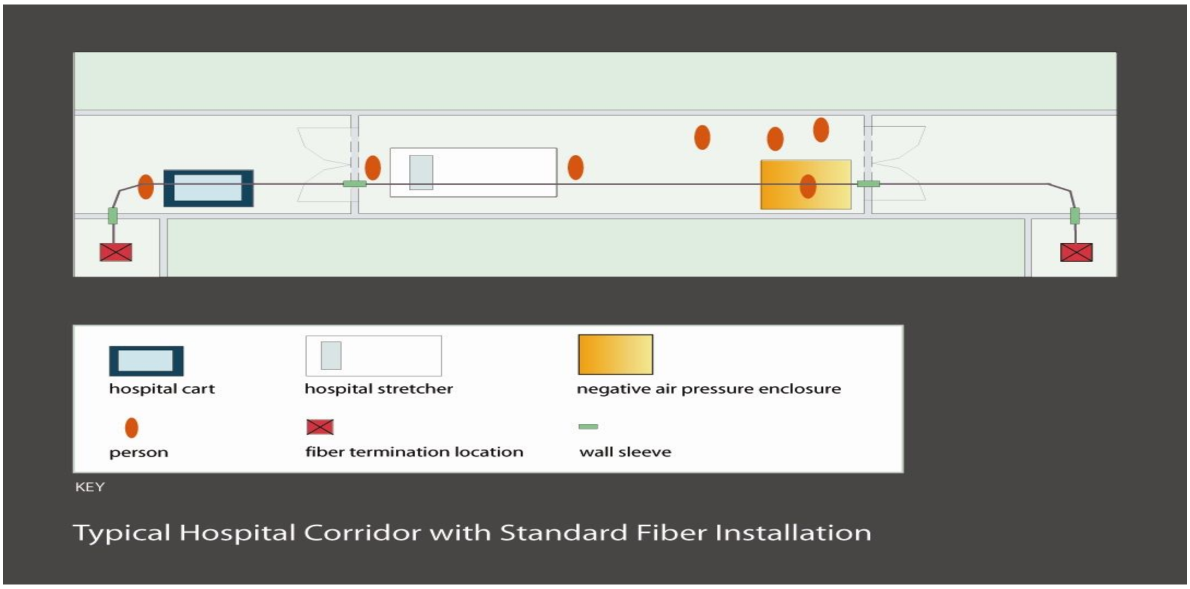
To emphasize the time consumption and disruption that the infectious disease control measures impose upon the hospital-healthcare facility, an illustration of a conventional cabling upgrade utilizing the use of the NAPE more fully explains the process. The NAPE is a negative air pressure enclosure used to remove suspended ceiling tiles for cabling upgrade, expansion, or reconfiguration.

The typical enclosure size is 3ft w x 5ft long x 6ft high and extends upward to approximately 10ft. The cost of an enclosure ranges between 3 - 6 thousand dollars. The enclosure(s) is rolled out to the required location where the ceiling tile must be removed and is extended upward against the ceiling immediately around the tile. When the ceiling tile is removed, any particles or contaminated air will be drawn through the sealed enclosure created by negative air pressure (via an attached vacuum that has a HEPA filter). The need to use these NAPEs adds time and cost to the installation/removal of cable, which is negated if the air-blown fiber infrastructure is adopted. Per figures 4 and 5, the NAPEs are unsightly and consume significant space.

Figure 4 — Non-extended NAPE

Figure 5 — Non-extended NAPE

The diagram below is drawn to scale and represents a typical 8 ft. wide hospital corridor. The illustration reflects a plan typical of the required path of the conventional fiber optic cable to be installed from one telecommunications room to another. The telecommunications rooms are the fiber termination locations/endpoints. The fiber between the endpoints is installed above the access ceiling tiles and through existing walls/fire-stopped wall sleeves (conduits).



As seen in the diagram, materials and equipment, including the NAPE and fiber optic cable reel — along with the contractors required to install conventional fiber —immediately congest the corridor. Per the diagram, the need to push a hospital stretcher through the same area becomes challenging.

For the contractors to install the conventional cable through the wall sleeves, the fire-stopping material must first be removed. Once installed, the fire-stopping material must be replaced. This process requires the NAPE to be set up in front of the corridor doors blocking and restricting access. At times, the enclosures may also block access to treatment rooms, further disruption staff workflow and the daily operations of the healthcare facility. Contractors performing these installations often must take the time to pull the enclosures down in order to allow patients to be transported through the corridor or allow staff access to work areas.

Although the use of the NAPE reduces the risk of spreading diseases, contractors still must lift the ceiling tiles for each new fiber install. Moreover, congesting the corridors with the NAPE and other equipment poses yet another risk to patient and staff safety. Due to the cumbersome and expensive infection control procedures utilized for installing conventional fiber optic cable and the consequent disruption to operations, hospital IT departments may feel compelled to install spare fiber strands (dark fiber) in order to minimize the probability of having to replace the cable again. This investment in dark fiber that may never be used or that could become obsolete is yet another additional cost in this conventional cabling project.

By adopting the FutureFLEX Air-blown Fiber infrastructure, hospital and healthcare facilities can enjoy immediate compliance to ICRA standards, eliminate the time and costs associated with infectious disease control procedures, eliminate disruption to workflow and daily activities, and have installed the most environmentally friendly and patient safe network infrastructure available, while quickly and easily completing the network project in record time.

Cost Comparisons and ROI

Depending upon the network pathway, the initial air-blown fiber installation of tubes comprising the infrastructure, may be less, sometimes equal, but most often will cost more to install than pulling conventional fiber optic cable. If the air-blown fiber installation is more expensive than the conventional fiber optic cable pull, generally payback is achieved on the 1st project following the initial empty tube infrastructure installation. However, most pleasing to the CFO and CIO is the fact that, after the initial installation of tubes, the FutureFLEX Air-blown Fiber infrastructure continuously saves significant budget dollars with each and every network upgrade, expansion, or reconfiguration project, yielding continuous ROI. Due to the ease and speed in which network projects can be accomplished with air-blown fiber, the labor savings are significant. Reductions in project costs between 70 to 90% are most often the case when compared to the cost of a conventional cabling solution. With a conventional fiber optic infrastructure, each network project burdens the hospital or healthcare facility with recurring costs, generating zero return on investment.

Actual cost data of two hospital systems — Sharp HealthCare of San Diego, and Penn State Hershey Health System — which have adopted the FutureFLEX Air-blown Fiber infrastructure for their campus backbone, best illustrates the cost savings generated by the Air-Blown Fiber infrastructure.

Project Summary 1: This project requires that 12 strands of multimode fiber be installed between 2 buildings in the Sharp Memorial Hospital campus in San Diego, CA to improve safety fire alarm system operations. There is an extensive duct bank system with manholes running throughout the campus. Manholes are near a busy loading dock and in access areas to an important hospital administration building.

Project Details:

- For a traditional fiber optic installation, closing the dock and staff safety is an issue for concern. With the Air-blown Fiber Infrastructure, it is not.
- ABF is not disruptive to the campus, since it requires no construction work
- Installation of additional fiber in a conventional infrastructure further crowds conduit system, limiting network growth capacity
- Installation of ABF 4-Tube (only using 1 of 4 tubes), allows for 300% growth

Cost Comparison Chart *(assumes both the air-blown fiber tube infrastructure and the conventional fiber optic cabling pathways have already been installed).*

Material & Labor ($75/hr)	**Time**	**Conventional ($)**	**Air-Blown Fiber ($)**
1,200' 12 strand multi-mode Fiber/ABF Fiber Bundles + misc. materials		$2,160 fiber $1,000 misc.	$1,440 fiber bundle $500
4 Manhole Prep and safety set-up; pump manholes, verify air quality, pull strings etc	24 hrs	$1,800 labor	--------
Install innerduct or Maxell-type fiber protection through duct bank	64 hrs	$1,100 material $4,800 labor	--------
Install plenum innerduct (underground conduit to above ceiling to route FACP	16 hrs	$180 material $1,200 labor	--------
Install new 4 tube ABF from TDUs to on both sides of path to FACP	20 hrs	-------	$560 material $1,500 labor
Couple tube in TDUs, verify pathway, pressure & obstruction testing	3 hrs	-------	$225 labor
Labor to pull conventional fiber optic cable vs. blowing fiber via ABF	64 hrs vs. 4 hrs	$4,800	$300
TOTAL COST (assumes termination costs are equal)	168 hrs vs. 27 hrs	$17,040	$4,525 (73% Savings)

As illustrated in the cost comparison chart, the project with the FutureFLEX Air-blown Fiber Infrastructure in place was completed in 27 hours versus the 168 hours it would have taken had a conventional structured cabling solution been used. Total savings utilizing air-blown fiber was 73%. As multiple projects are being deployed throughout the healthcare campus, the savings accumulated with air-blown fiber can be quite impressive.

A second project described by Sharp HealthCare further emphasizes the cost savings associated with the air-blown fiber system.

Project Summary 2: Connecting the Main Distribution Frame for Sharp Grossmont Hospital (located in new tower, basement level) to the Women's Center's Intermediate Distribution Frame 1,200' away through a difficult pathway. 12 Strand Single-mode Fiber Needed. (Assumes terminations & testing are equal in cost). * Assumes both Conventional & ABF Underlying Infrastructure Pathways Have Been Already Installed

Material & Labor ($70/hr)	**Time**	**Conventional ($)**	**Air-Blown Fiber ($)**
1,200' 12 strand single-mode Plenum Fiber/ABF Fiber Bundles		$1,680	$1,680
1,200' plenum rated innerduct $85/ft		$1,020	--------
Labor to set-up infection control	8 hrs	$ 560	--------
Labor to install innerduct	128 hrs	$8,960	--------
Labor to couple tubes & test	6 hrs	-------	$420
Labor to pull conventional fiber optic cable vs. blowing fiber via ABF	128 hrs vs. 4 hrs	$8,960	$280
TOTAL COST	**400 Vs 10 Hrs.**	**$21,180**	**$2,380 (89% Savings)**

This actual project example, provided by Clint Morgan, president of National Electric Works, the technical consulting company for Sharp HealthCare, further exemplifies the significant time savings in deploying projects with the FutureFLEX Air-blown Fiber infrastructure. Had conventional structured cabling solutions been utilized for this project, the turnaround time for completion would have taken 50, 8-hour work days versus only 10 hours with FutureFLEX Air-blown Fiber.

To provide insight into the air-blown fiber infrastructure's ability to generate continuous ROI, let us examine less favorable set of circumstances in which the more expensive initial air-blown fiber tube installation is brought into the equation. Please keep in mind that the cost of the initial air-blown fiber installation varies depending upon contractor bid quotations. In the following two examples of actual projects at Penn State Hershey Health System in Pennsylvania, the lowest contractor bid for a conventional fiber optic infrastructure is assumed.

Project Summary 1: An interconnect requiring 2,000 feet of 48-count single-mode and 12-count multimode fiber run on the Penn State Hershey Health System campus.

External (2000' 48SM/12MM)

	Initial Install	**Add to Path**	**Total**
Air Blown	$25,202	$10,387	$35,589
Conventional	$21,101	$19,628	$40,729
Cost/Savings	-19%	47%	13%

In this example, the initial installation of the air-blown fiber tube cable was more expensive to install than the conventional pulling of fiber optic cable. For some network and facilities managers working with a short-term budget, the higher initial bid quotation may halt further consideration of the air-blown fiber solution. However, payback of the air-blown fiber installation premium is typically realized on the 1st project following the initial tube installation with a constant flow of significant labor and time savings thereafter, with project turnaround times reduced from days to hours. As the table above exemplifies, the addition of the fiber run actually generated a return on investment that will continually compound to impressive cost savings for the hospital-healthcare facility with each additional network project, while providing the facility with virtually limitless network capacity for growth.

Project Summary 2: Fiber run to interconnect a clinical area from an intermediate distribution frame to a main distribution frame for Penn State Hershey Health System. Infectious disease control measures and preparation, as well as disruption to clinical area workflow, would have been necessary if conventional cabling had been chosen. With air-blown fiber, these concerns were non-issues.

Internal (500' 24MM)

	Initial Install	**Add to Path**	**Add to Path**	**Total**
Air- Blown	$15,236	$6,558	$6,558	$28,352
Conventional	$12,177	$11,157	$11,157	$34,491
Cumulative Cost/Savings	-25%	7%	18%	

As the table illustrates, payback of the more costly initial air-blown fiber installation is quick with compounded savings and a continuous ROI thereafter. The added value of patient safety, no risk to infection, and no disruption to clinical workflow is immeasurable.

Unlike conventional structured cabling, the FutureFLEX Air-blown Fiber infrastructure …

- Generates continuous and significant cost savings with each network upgrade, expansion or reconfiguration project
- Yields continuous ROI compounded by multiple network projects
- Eliminates the recurring network project costs of conventional infrastructure solutions
- Eliminates the costs associated with staff workflow disruption
- Provides immediate control of real-time budget dollars by eliminating dark fiber investment with a Pay-As-You Go approach, one network project at a time
- Eliminates the costs and risks of infectious disease control and patient safety processes

Conclusion

Until the introduction of FutureFLEX Air-blown Fiber, the IT network infrastructure of hospital-healthcare networks has been stagnated for decades against the rapid software and medical technology advancements in the evolution of improved healthcare. When comparing conventional fiber optic cabling solutions to the Air-blown Fiber infrastructure technology, it becomes apparent that the latter provides today's solutions for the network needs of today's hospital and healthcare facilities.

By resolving the limitations of traditional fiber optic cabling, FutureFLEX Air-blown Fiber technology offers healthcare IT departments, facilities managers, and CFOs with a new lease in addressing the bandwidth, speed and delivery, network growth, and financial constraints having prevented, until now, the full realization of an immediately scalable, responsive, cost-effective, and ROI-generating network infrastructure.

Placing these benefits aside, the FutureFLEX Air-blown Fiber infrastructure is worthy of consideration solely on its ICRA compliance and its ability to provide a clean and safe method of making network changes by reducing patient and staff risk to infection — allowing the hospital-healthcare IT network to evolve in real-time with the continuing evolution of healthcare, emerging technologies, and patient safety.

About the author

Christopher Archer is a senior communications design engineer and an RCDD. He has been with Brinjac Engineering for the past 10 years. Chris is the lead engineer on a multitude of healthcare, educational, and commercial projects and is responsible for engineering Interplant and Intraplant structured cabling systems to support voice/data/CATV/physiological monitoring, as well as engineering active telecommunications and data network systems. He also has extensive experience engineering Nurse Call systems and wireless network solutions. Chris is currently providing engineering services for Penn State Hershey Health Systems' new Cancer Institute and Children's Hospital to include Sumitomo FutureFlex Air-blown Fiber network infrastructure. Chris is a member of BICSI. Please visit www.brinjac.com

About Sumitomo Electric Lightwave and FutureFLEX® Air-blown Fiber® Infrastructure

Sumitomo Electric Lightwave, located in Research Triangle Park, NC, was established in 1984 and manufactures both conventional fiber optic cable and Air-blown Fiber solutions. Sumitomo is dedicated to the development and manufacturing of optical fiber cable, network products, fusion splicers, and FTTP solutions. In 1991, it was the first company to introduce Air-blown Fiber to North America and has since then been responsible for its presence and its continued development as the most advanced system for the LAN and enterprise network. Representative FutureFLEX customers include: CNN, ESPN, Pentagon, Mayo Clinic, McCarran International Airport, Johns Hopkins University, Toyota, ConocoPhillips, Vancouver International Airport, Department of Homeland Security, Arizona Cardinals Stadium (Home of the 2008 Super Bowl), Central DuPage Hospital, and others.

Sumitomo was cited in the 2008 Cables Industry Analyst report as the world's largest cable manufacturer. For additional information, please call 877-356-3539, email fflex@sumitomoelectric.com, or visit us at www.sumitomoelectric.com and www.futureflex.com

Sources:

1. *Costly Infections*, Nov. 1, 2007, www.healthcare- informatics.com
2. Actual financial and project data supplied by Sharp HealthCare of San Diego (9 time recipient of the Most Wired Hospital designation and Clint Morgan, President, National Electric Works http://www.nationalelectricworks.com/ and Penn State Hershey Health Systems

For more information, please register for Health Forum's archived webinar featuring Bill Spooner, CIO, Sharp Healthcare and Sherry Mettley, Director of IT Infrastructure at Penn State Hershey Health Systems as they address Air-blown Fiber technology:
http://w.on24.com/r.htm?e=107829&s=1&k=98C02827F50E7098812F833BAE15EF57&deletecookie=true
or register on the FutureFLEX Air-blown Fiber homepage at www.futureflex.com