TE Connectivity Solutions Guide for Airports
Driving the Velocity of Change With Agile, Efficient and Secure Networks

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1. Scope

This document will provide guidance to the planning and deployment of IT network infrastructures within an airport. It explores the airport environment in which IT managers have defined business and technology objectives, are faced with unique security challenges and have definite expectations of the benefits of the solutions they are implementing. It provides recommendations based on TE's decades of experience in this market and investigates specific areas of the airport IT infrastructure.
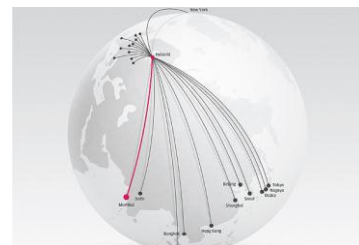
2. Introduction

Many of the common airport operations and business models have undergone a radical transformation in the last few years, specifically to support the explosive growth of the global airline industry.

On one hand, most airlines have refined their operating models to align growth to efficiency. In most cases this has led to the adoption of mergers and acquisition strategies or the creation of strong global alliances. On the other hand, airports have evolved in parallel to create massive networks of hubs often referred to as "airport-cities", or in the most extreme cases -- aerotropolies.
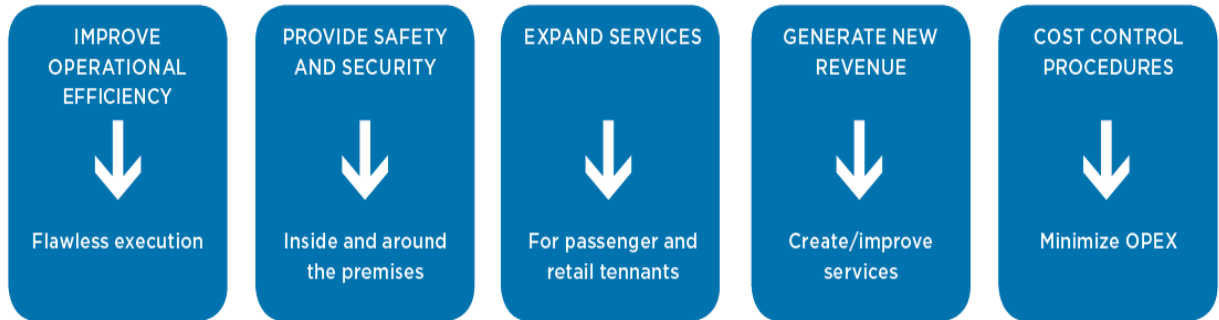
Today's airports have become the epicenter of any successful and dynamic economy. Whether it is a small or large business, the true recipe for success is contained within a well-structured supply chain. This relies almost entirely on airport operations to deliver world class business services and reach customers around the globe.

Have you ever purchased goods that came from a remote geographical location? Airport operations help to accelerate the whole sales process so that goods can reach distant customers within days, or even hours -- moving across different continents perhaps aboard a Dreamliner Cargo 787*.
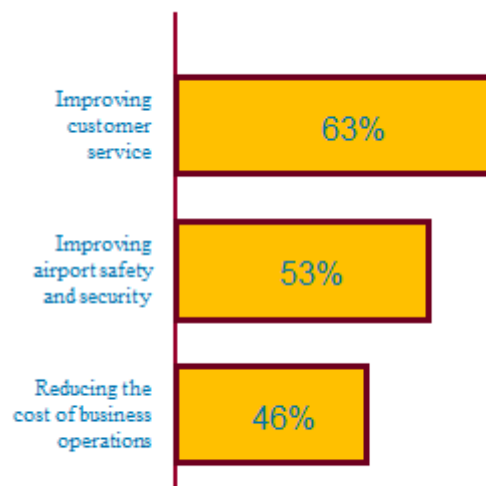

*TE was a development partner of Boeing on the Dreamliner™ project which involved 8 years of co-engineering working

But nothing is without its' challenges. Airports have introduced increasingly complex operations with the intent to focus on effectiveness rather than more efficiency. A new set of objectives has developed which changed the way airports are managed and controlled in order to fit new and more demanding business models without compromising the security of each individual stakeholder. Airport operators and managers are often measured against a list of challenging objectives as illustrated below:

| IMPROVE OPERATIONAL EFFICIENCY	PROVIDE SAFETY AND SECURITY	EXPAND SERVICES	GENERATE NEW REVENUE	COST CONTROL PROCEDURES
⬇	⬇	⬇	⬇	⬇
Flawless execution	Inside and around the premises	For passenger and retail tennants	Create/improve services	Minimize OPEX

Within this complex scenario of operations and tight business objectives the IT infrastructure plays the important role of a strategic mechanism that allows for the deployment of new services quickly and seamlessly, enabling airports to respond rapidly to environmental and operational changes. From a business value perspective, a sound IT infrastructure can help deliver advanced operational efficiencies, enabling faster turnaround times for airlines, faster set-up times for tenants, and improved passenger experience.

As a result, the main business drivers for IT investments are represented as shown below.

Improving customer service — 63%
Improving airport safety and security — 53%
Reducing the cost of business operations — 46%

Source : Airports Council International & SITA - 2011

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3. From Airports to Airport-Cities to Aerotropolies
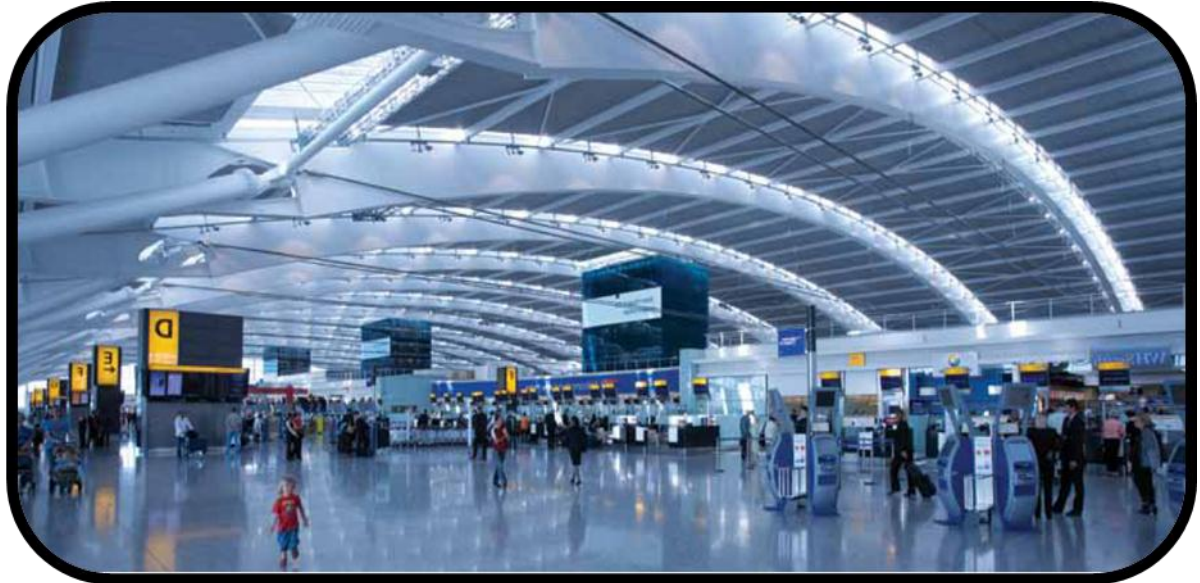
Originating with the wide-spread concept of an **airport** as a location where aircrafts take off and land, during the past few years there has been a radical shift towards a more sophisticated environment known as airport-cities.

The **airport-city** model assumes the fact that an airport can be much more than traditional services, developing therefore new non-aeronautical commercial facilities and services to create alternative revenue streams.

However, with airports typically surrounded by vast amounts of undeveloped land ready to be exploited, it becomes apparent that airports are sitting on a potential cash-cow of real estate opportunities. So the concept of **aerotropolies**** comes to life as an urban form whose layout, infrastructure, and economy is based on a very large airport model that encompasses office blocks, hotels, healthcare facilities, convention centers and provides hundreds of services in the effort to generate new sources of revenues.

**The concept of aerotropolies was reintroduced by J.D. Kasarda in 2000 after its first inception in 1939 by N. DeSantis
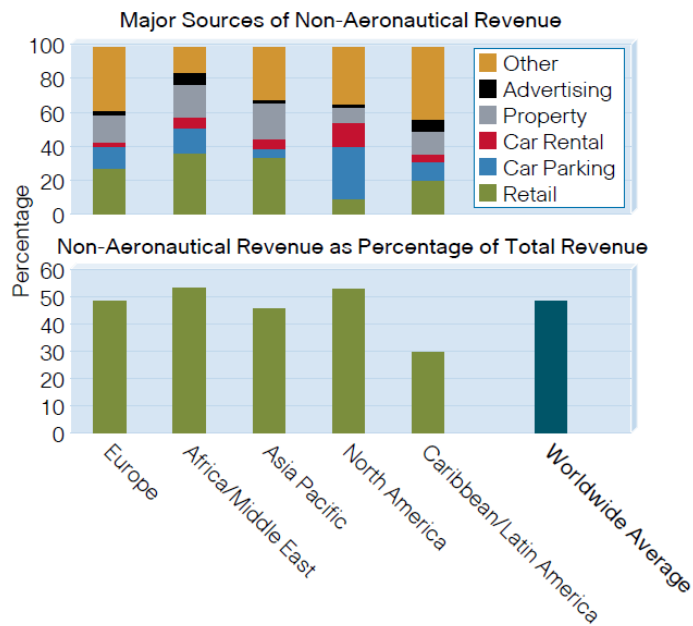
Figure 4

Source: ACI and University of Westminster London – 2009 –

Figure 4. illustrates a global average of non-aeronautical revenue as a large portion of airport income. So, from the smallest airport to the largest aerotropoly, it remains a given that the IT Network Infrastructure functions as a common denominator, a strategic asset that enables the evolution of revenue-generating services and supports their associated technologies.

4. IT Infrastructures within Airports

Airports have become media-rich environments with complex applications being delivered across a secure network.
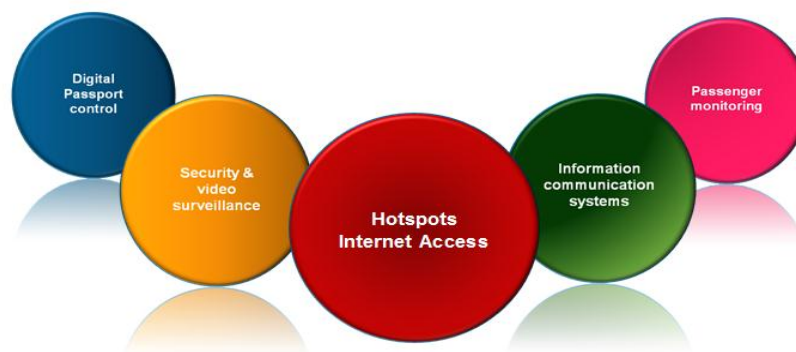
A city within itself, the airport hosts a great deal of passenger-focused services like retail shops, restaurants, Wi-Fi hot spot, check-in, baggage reclaims, parking, immigration and flight information details on the terminal and landside. Command Centers, air traffic and ground control, security, maintenance, food services, employee and airline staff systems on the airside area. This represents an enormous amount of complexity for a network solution to handle and maintain all at once.

Airside		Terminal		Landside	
➢ Air Traffic Management ➢ Resources Management ➢ Security	➢ Parking ➢ Maintenance ➢ Fuel ➢ Catering	➢ Check-in ➢ Retail ➢ Passport control ➢ Security	➢ Shops ➢ Food and beverage ➢ lounges ➢ Boarding area	➢ Parking ➢ Car rental ➢ Security	➢ Traffic Management ➢ Maintenance ➢ Third party providers

Very often these applications, as we have seen inside the terminal and in the airside areas, use different telecommunication equipment's and protocols adding even more complexity and risks failure. Furthermore, with an increasing number of passengers carrying their own "digital foot-print" it is with no surprise that airports have become more data sensitive. Information need to be handled and preserved in the safest possible way in order to protect the security of millions of passengers. It is no by chance that today IT operates as a strategic asset and facilitator for transformation in an increasingly digital passenger environment.

4.1- IT Challenges

Before any planning begins, it is important to understand what challenges are present that need to be overcome. Years of experience in the global airports market has provided TE Connectivity with valuable knowledge and understanding of the major challenges that Network Managers / Facility Manager often have to face.

- Provide enough flexibility to scale up or down depending on current needs

- Support constant passenger free-flow

- Provide better service to match customer expectation

- Manage baggage handling more effectively to reduce passenger disruption

- Create seamless processes to reduce operational costs – maintenance – obsolescence

With many different systems and applications that need to be deployed across separate and remote areas managing a network infrastructure can become a tough riddle. This is further aggravated by the need to provide a more flexible environment for scaling up or down the amount of services provided to passengers and tenants. Among such a great level of complexity there is an overarching objective to reduce operational cost and boost efficiency.

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4.2- Network Infrastructure Considerations

In the effort to achieve the objectives and overcome most of the challenges many IT managers are considering the adoption of IP Convergence and network consolidation strategies. However, it is important that facility, security and information technology managers collaborate and ensure that the supporting cabling infrastructure is designed and deployed to provide optimal performance levels. Their common objectives should ensure resiliency, reliability for maximum uptime, and easy implementation and management of new applications.

The advantages delivered by the deployment of a converged network can easily justify the efforts and the investments that needed to be allocated towards its implementation. Reduced complexity, minimum pathways congestion, improved security and considerable lower OPEX are only some of the advantages gained.

AIRSIDE SYSTEMS
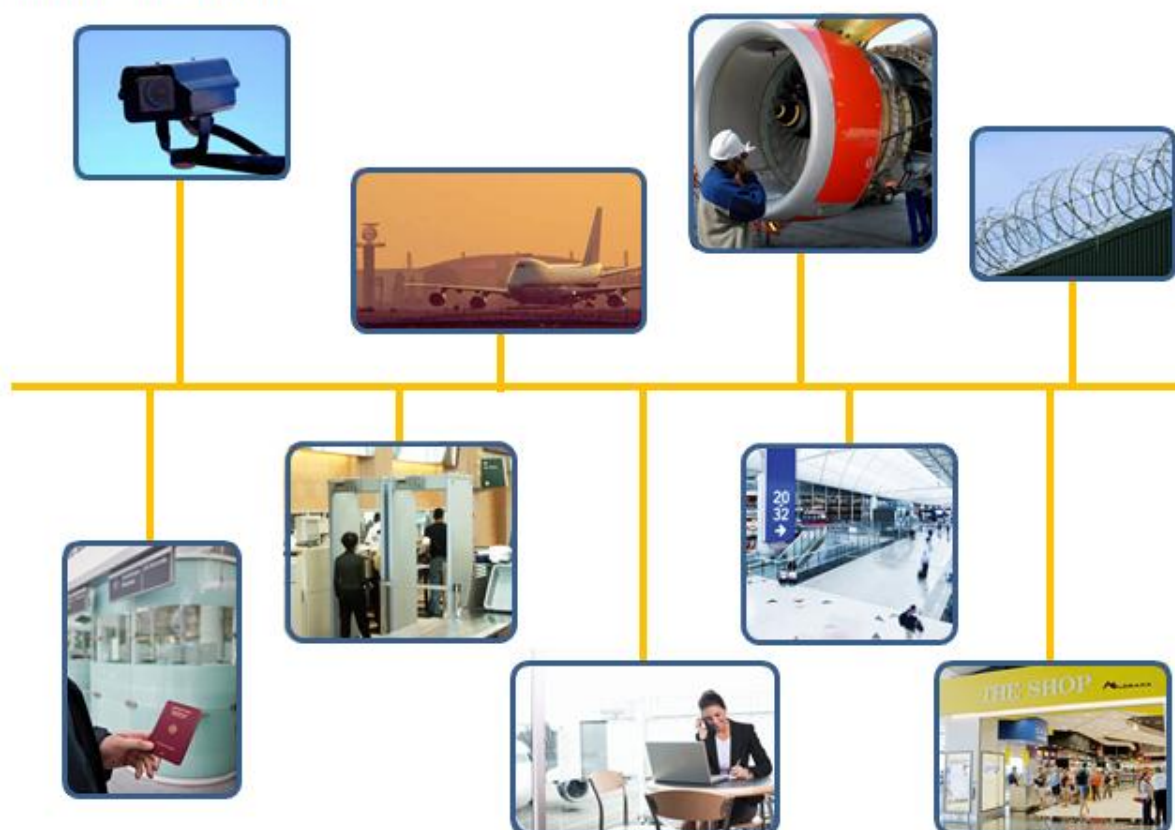
TERMINAL & LANDSIDE SYSTEMS

Airport facilities are normally expected to last for decades while providing a high level of flexibility to support spikes in passenger demand and tenant relocations. With the multitude of network infrastructure design choices available today, IT managers are constantly faced with the challenge of how to optimize their data communication requirements. As well as traditional data transfer functions, new IP reliant applications such as VoIP, video streaming, live feeds, and surveillance systems for the office and data center are continuously emerging. Consequently, faster and more reliable infrastructures are required to ensure that business critical applications are future proofed and return on investment optimized.
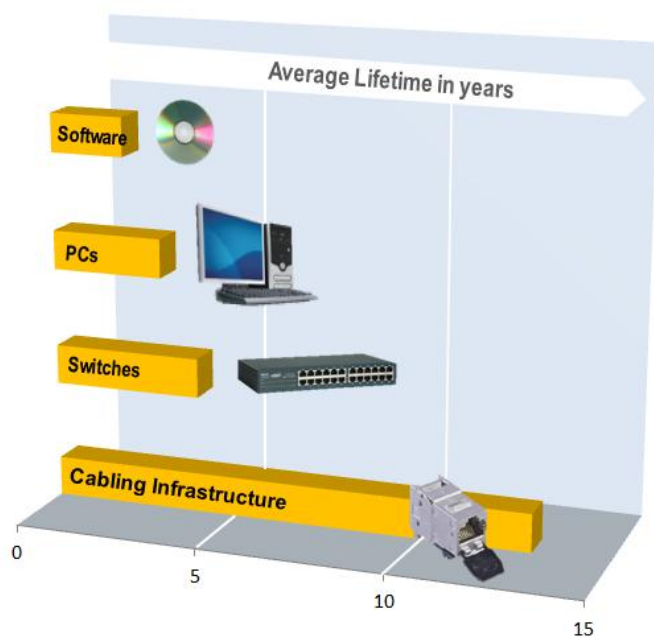
Lifetime of Network Equipment

With the constant growth of processor power inside workstations, the demand for faster communication throughout the premises increases year by year. Considering that the physical layer of your network – the cabling itself – has an average lifetime of 12 to 15 years, it must be capable of serving about 3 generations of switching equipment, 4 generations of PC hardware and probably even 5 generations of software! Thus, planning for a fast and future proof communication network starts with the investment of a strong cabling system...

In addition to this, critical applications such as security, baggage handling, control towers and customer boarders need to be protected by the detrimental effects that could be caused by EMI/RFI present in the surrounding environment. Hence, the network infrastructure solutions must be proven to support long distances at the highest bandwidth with reliable, secure and accurate transmission of information protected by any EMI/RFI effects.

A sound network physical infrastructure needs to allow for seamless integration of the latest technologies such as Voice-over-IP (VoIP), Wireless (Wi-Fi), Distributed Antenna Systems (DAS), Power-over-Ethernet (PoE), Intelligent Infrastructure Management Systems (IIMS) including future Building Automation Systems (BAS).

So, what media should be deployed to deliver the best level of services within an airport environment? In reality there is no right or wrong answer. Although there is tendency to

believe that fiber optic would meet all the requirements, the reality is that a mixture of both copper and fiber has often proven to be the most effective approach to overcome all the challenges and maintain control of costs. However, because no two environments are ever the same, it is always advisable to carry out a site assessment before making any final decision on media deployments. This will guarantee the best possible fit of the network physical infrastructure in relation to the challenges posed by the surrounding environment.

Some examples of media choices are provided here below:

Terminal & Landside Areas

Airside areas

It is critical to note that a properly designed and installed cabling plant provides a solid foundation to deliver predictable and consistent performance, as well as providing the flexibility to support future airport applications without making significant changes to the rework.

5. Responding to the Environment

From the data center to remote terminals, TE's physical infrastructure solutions are designed to serve any airport environment by supporting various critical applications while reducing complexity in design and implementation.

Airport Systems Are Complex and Numerous.
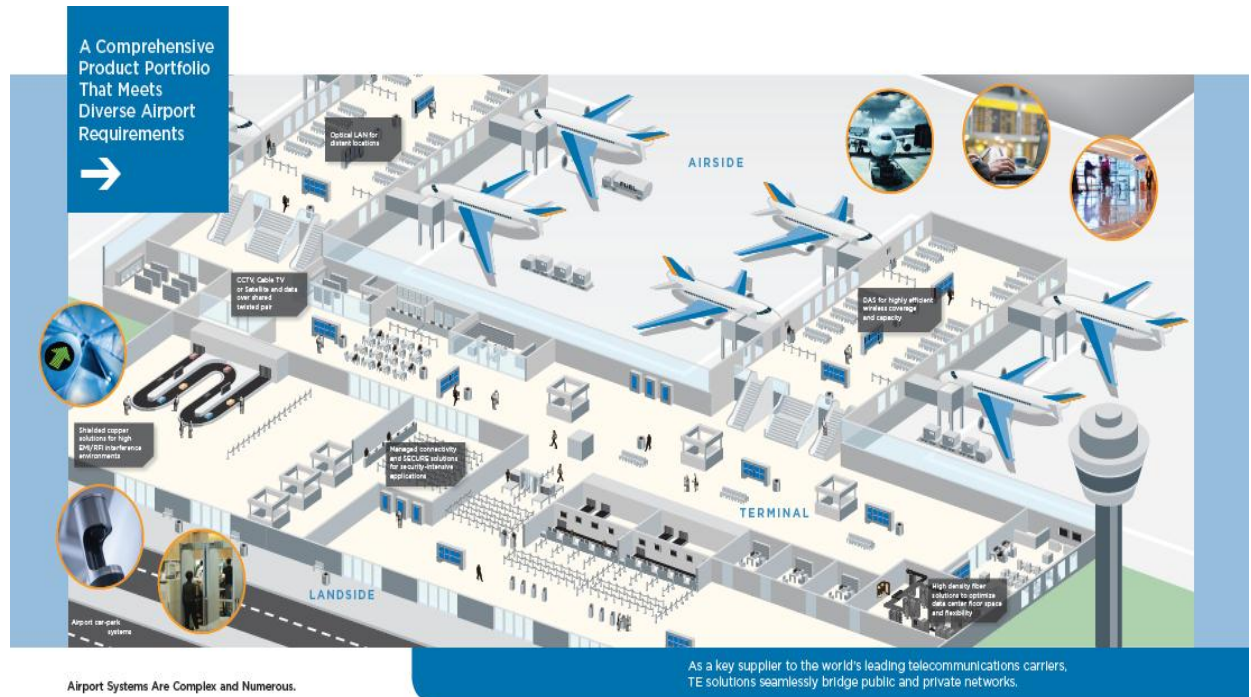
Decades of experience in the airport market with more than 50 projects deployed around the world provides TE with a high level of knowledge and understanding of the environment.

Here are recommendations for TE solutions that can better respond to airports needs and address the challenges posed on their network infrastructure.

EMI/RFI interference environments:

Some specific areas within an airport may be susceptible to Electro-Magnetic-Interferences (EMI) or Radio-Frequency-Interferences (RFI). Baggage handling and control towers are probably the most obvious instantiation of areas that are likely to be affected by the surrounded environment and therefore need special considerations.

Cabling standards throughout the world have adopted the MICE (Mechanical, Ingress, Climatic, and Electromagnetic) classifications for office and industrial environments. According to EN 50173-1:2007 an electromagnetic classification of "E3", which normally describes a heavy industrial environment, is applicable:

●If your premises are within a radius of 1 km from a TV, radio or mobile base station

●When you are using DECT phones within your premises

●When you are using wireless data (Wi-Fi) equipment

Generally Background Noise is the sum of all the electromagnetic fields of adjacent devices. Immunity against Background Noise can be achieved by either shielded cabling or a fully enclosed pathway. Either requires proper earthing and bonding practices.

To ensure flawless 10Gb/s data transfer, the IEEE standard limits the Background Noise level at the device to a max of –150 dBm/Hz, which in most buildings is compromised by wireless devices such as cellular phones, Wi-Fi and aerial video transmissions.

The ability to mitigate these noise signals enables you to ensure flawless transmission of your High Definition Video Conferencing equipment, and removes any signal influenced disturbance on your IP telephone system.   As we become more reliant on the timely delivery of signals, it is recommended that you fully protect your systems.
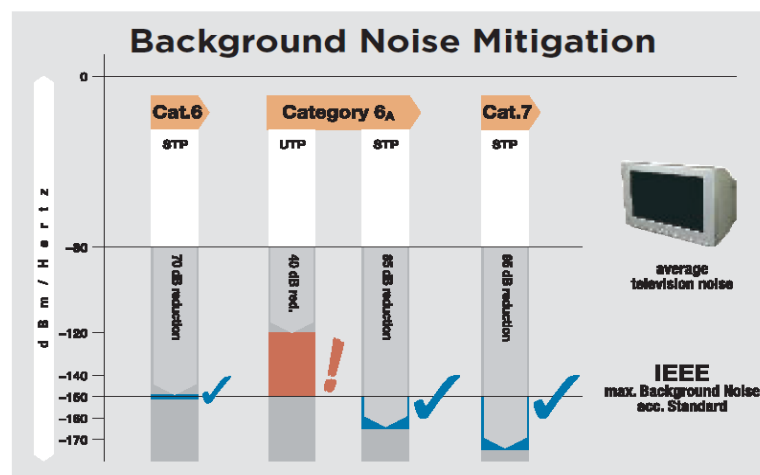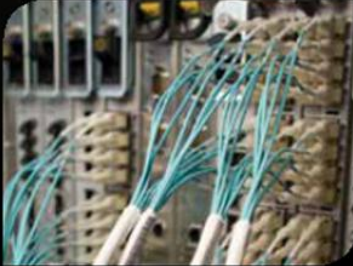
In most cases copper shielded solutions help to ensure optimum protection against the adverse effects of external signal interferences. Simply by design, shielded systems provide total immunity against RFI/EMI and are capable to support highest bandwidth applications of 10GbE and above.

TE's many years of experience in shielded technologies deliver state-of-art systems to protect signal integrity and ensure maximum performance with minimum downtime.

6. TE provides end-to-end infrastructure solution

With every facet of administration, staff members and passengers are heavily relying on the IT network, therefore airports need a trusted partner with the proven experience, a comprehensive product portfolio and innovative expertise to deliver a high-bandwidth, mobile and manageable infrastructure that can cost effectively support the needs of today and tomorrow. That partner is TE Connectivity.

CABLING SYSTEMS

Fiber or copper, shielded or unshielded. TE's range of cabling and connector products form the infrastructure of some of the world's largest 'mega data centers.'

PLATFORMS

TE's integrated cabling platforms for high fiber count and mixed media environments include platforms that are custom designed to work with specific configurations to deliver efficient and agile data center operation.

MANAGED CONNECTIVITY

TE Connectivity has sold more intelligent ports worldwide than any other manufacturer and has now introduced Quareo, the world's first managed connectivity solution based upon connection point identification technology.

6.1- Data Center

Known as the heart of the IT network, airport operations rely on their information systems and storage to run operation such as security, check-in, luggage traffic and many others. Airport service continuity is essential in a just-in-time environment where any downtime could create operational extra costs and, most damaging, customers' disappointment.

TE jointly develops solutions with many of the world's leading data center equipment manufacturers. This combined with global reach and innovative managed connectivity technology, puts TE Connectivity in a unique position to help our customers deliver on their business requirements by creating a resilient, efficient and agile data center infrastructure.
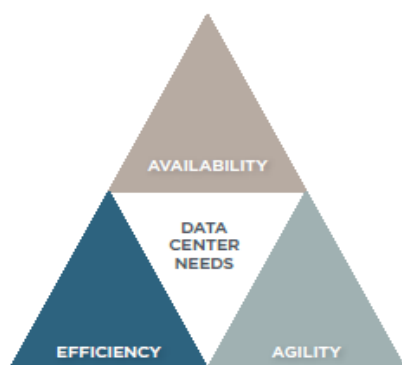
AGILITY: Networks constantly change and grow. Our storage Are Management Solution (SAM) and Q3000 high-Density fiber solutions can help ensure successful network upgrades and implementations with maximum ease and control.

AVAILABILITY: TE's Managed Connectivity Solutions, including our Quareo connection point identification technology can help increase uptime, resilience and service continuity by delivering an automated, real-time understanding of end-to-end network connectivity.

EFFICIENCY: Our energy saving MRJ21 cabling system, along with industry-leading high density cable management solutions like our FiberGuide^{TM} optical raceway can help ensure stringent CAPEX and OPEX control.

FIBER

Fiber Panels

Fiber Cable

FiberGuide Optical Raceway

Storage Area Management

Managed Fiber Chassis

MPO Cassette

COPPER

MRJ21 Pre-Terminated Copper Cable Assembly

Highband Block

MRJ21 Patch Panel
Front (left) Back (right)

Cat 6A F/UTP Cable

Cat 6A U/UTP Cable

ENTRANCE FACILITY

MAIN DISTRIBUTION AREA

HORIZONTAL AND EQUIPMENT DISTRIBUTION AREAS
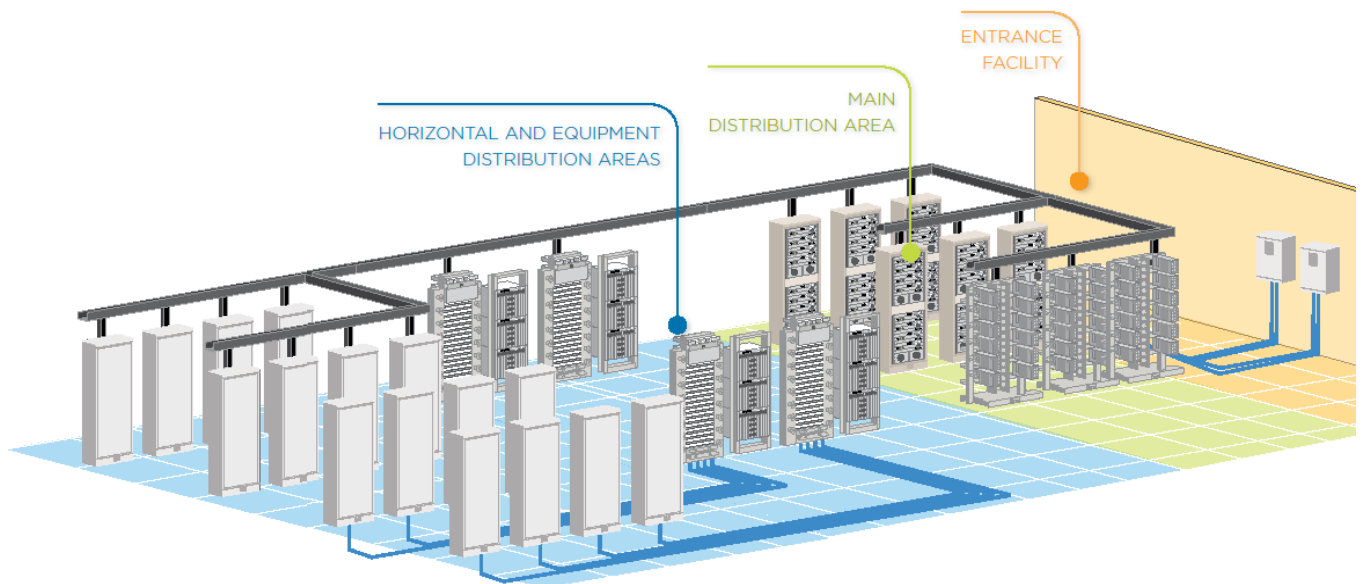
MANAGED CONNECTIVITY

Quareo

Infrastructure Configuration Manager Software

6.2- Across the Airport

An Office Network is a critical component of the IT infrastructure of your organization. The typical Office Network needs to support traditional PCs and peripherals but now also VOIP, digital media, devices, tablets and more. Connected devices have changed the business landscape and forever altered our expectations of Office Network technology. Smart phones and networked devices are satisfying our "on-line" addiction while challenging services provider's traditional networks and driving profound changes in broadband networks and the enterprise.

Fueled by end-user demand for bandwidth-hungry applications such as IPTV, video-on-demand (VoD) and the widespread use of smart phones and mobile apps, the flood of data surging across the world's networks is forcing service providers to continuously upgrade their networks to deliver the speed and services that customers demand.

A reliable, high-speed, high performance network infrastructure is essential to support the demands of the end users, new technologies and the needs of the business. Only TE can provide the cabling and connectivity solutions as well as the tools to manage your network. Thousands of customers around the globe trust TE technology as the foundation of their office networks.

Our LAN solutions include:

• **Copper shielded and unshielded** cable and connectivity to support the latest IP-based applications, from 1 to 10 gigabit Ethernet, to PoE, VoIP and security systems.

• **Cabling Infrastructure Management system** (Quareo) to bridge the gap between network management and the physical layer.

• **Video distribution system (VDS)** to cost-effectively deliver high-definition RF over twisted-pair cabling for distance learning, surveillance, digital signage and cable television.

• **Optical LAN solutions (OLS)** for indoor/outdoor, long-distance passive optical links that use a single strand of high-bandwidth singlemode fiber with lower power and space usage and reduced operation costs.

• **Distributed Antenna System (DAS)** creates a leading platform for serving wireless services.

6.2.1- Fiber and Copper Cabling Infrastructure

With one of the industry' broadest ranges of fiber and copper UTP and shielded products supporting applications from 1G to 10G, TE delivers the best choice of products to suit your specific network needs to the users.
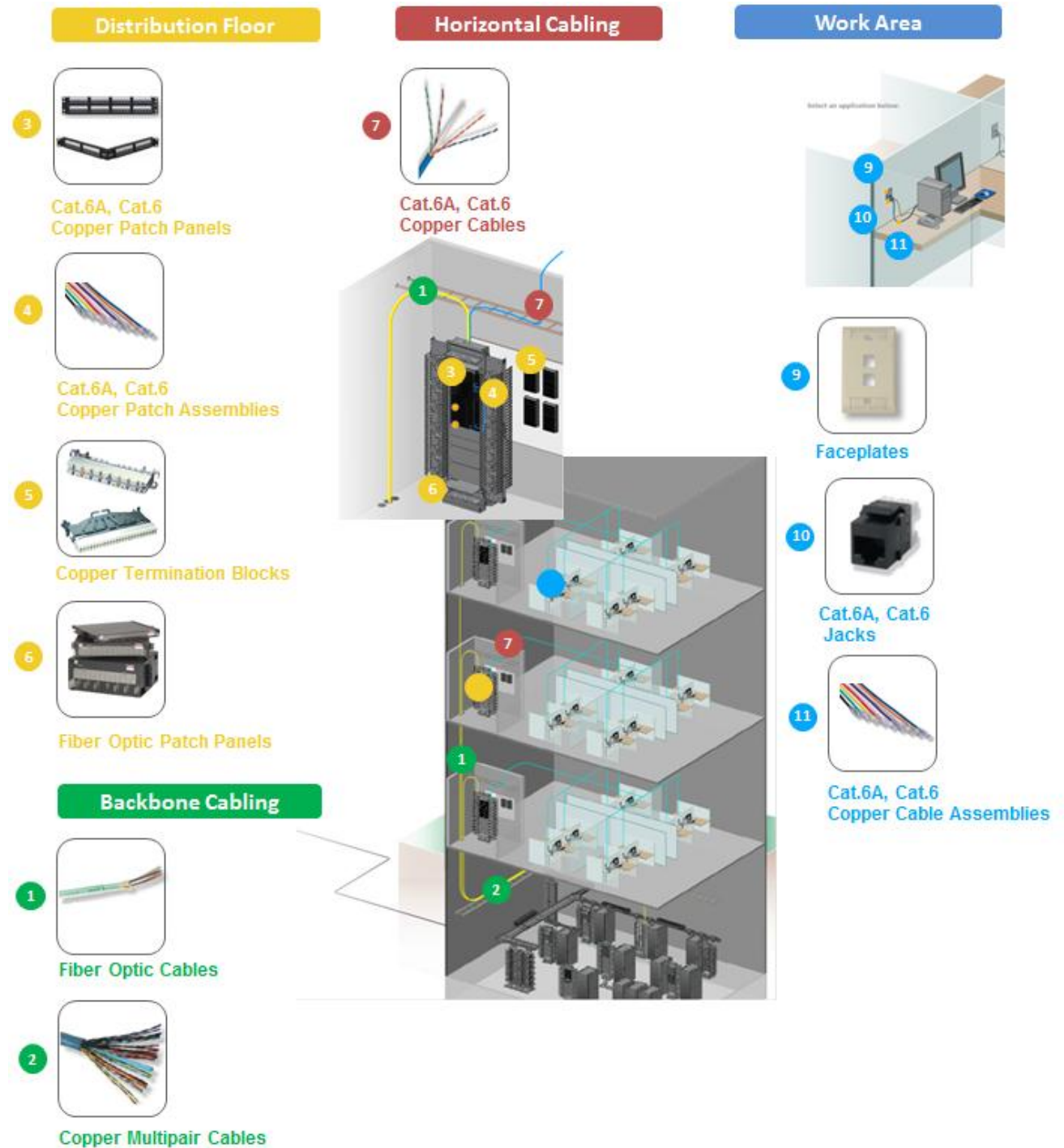
6.2.2- XG Cat.6A Copper Twisted Pair Cabling

While fiber effectively supports speeds beyond 10 and even 40 Giga, the industry is still embracing cost-effective copper. Whereas the shielded solution offers superior noise immunity to eliminate alien crosstalk and RFI/EMI, UTP solution utilizes superior technology to reduce alien crosstalk noise to enhance overall performance.
Both solutions meet all requirements for Category 6A AINSI/TIA and ISO Standards.
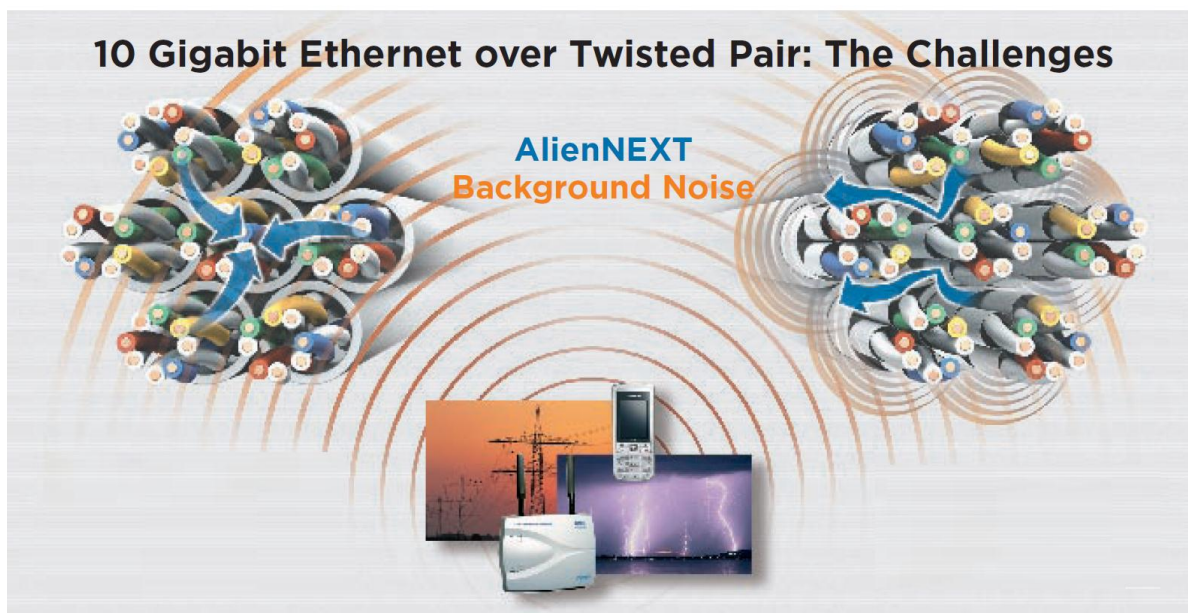
XG Cat.6A Copper Shielded Twisted-Pair
- Superior noise immunity to eliminate Alien Crosstalk and RFI/EMI
- More headroom
- Performance over 500 MHz for advanced and future applications
- Better heat dissipation to handle Power over Ethernet

The XGA Shielded Copper system for 10GBASE-T also has the benefit of requiring less space in cabling pathways and cabinets, while providing better background noise mitigation, making it an excellent choice for high speed application support.
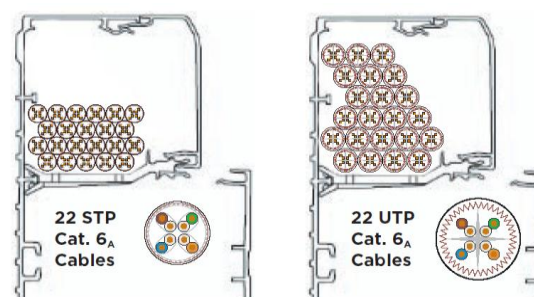
A UTP Cat. 6A 10 Gb/s system requires 60% more space in cabling systems than a comparable STP system.

Shielded cabling is widely installed throughout the world and always outperformed unshielded in a variety of applications.

XG Cat.6A Copper Unshielded Twisted Pair

Shielded Cat.6A solutions offer a high performance level, however Cat.6A Unshielded can be an alternative solution in a non-sensitive background noise environment. Thanks to AirES technology used in our XG Cat.6 UTP cables which reduce their diameter and the superior technology used in the connectivity to reduce alien crosstalk noise, the TE's XG Cat.6A unshielded solution is among the most performing unshielded solution in the market.

6.3- Managed Connectivity

In airports, every transaction, communication and facility operation is being accomplished with numerous end devices and applications that reside on the local area network (LAN). Accordingly, IT department needs to maintain and manage more connections than ever before throughout the physical layer infrastructure of the network. In the data center, the growing number of applications, virtual servers, storage devices and high-density switches, also is requiring more connections in physical layer, cross-connects between servers and switches. All these connections – from data user points to the data center – yield a much more complex physical layer.

The challenges and costs associated with network physical layer management and maintenance are staggering—the time consuming process of tracking, analyzing and resolving network disruptions has a direct impact on an organization's bottom line. As the physical layer becomes even more complex, these costs increase. While tools and software have long enabled network and data center managers to manage switch and server ports, the passive connections in the physical layer between the equipment and end devices have been excluded from these systems. With the physical layer being the foundation of the entire network that all business activities depend on, network and data center managers are now looking for ways to effectively manage this vital infrastructure in a way that improves productivity and response time while reducing downtime and operating expense.

Managed Connectivity solutions from TE are helping network and data center managers bridge the gap between network management and physical layer management, transforming the physical layer into a strategic asset and revolutionizing the way networks are managed and controlled. By providing real-time comprehensive picture of every connection point in the physical layer, managed connectivity significantly improves. Productivity and efficiency of physical layer management and maintenance processes while reducing costly downtime and operating costs.

With TE's managed connectivity solutions, network and data center managers can:
• Provide faster, more accurate service and repair
• Map and monitor physical layer connectivity changes
• Document and report network reconfigurations
• Identify and alarm unauthorized network access
• Track a variety of network assets in real-time
• Improve switch port and asset utilization

Why Manage the Physical Layer?

Businesses and organizations worldwide are more dependent on their physical layer than ever before. From computers, phones and wireless devices, to alarm systems, security cameras and video conferencing, today's network physical layer touches virtually every device throughout an organization. Security of the physical layer also has become a top concern among network and data center managers, especially in healthcare, financial and mission-critical organizations where data is required to be secure.

With 60 to 80% of unplanned downtime originating in the physical layer, the costs and time involved with managing today's complex infrastructures using traditional methods has taken its toll on IT departments. Human error, security breaches and time consuming maintenance are eating up IT budges, causing costly network downtime and increasing overall operating costs. Network downtime for any organization is an extremely costly situation—conservatively estimated at $42,000 per hour for the average organization, and up to $1 million or more per hour for an e-commerce or online brokerage firm (The Gartner Group). Furthermore, while data centers continue to house more equipment and connections, they are not necessarily adding more staff to manage these spaces. A study by AFCOM, a data center managers group, reports that while nearly 75% of data centers have increased their server count, 66% reduced or maintained their data center staff. That means that most of today's data centers are managing more systems with same number of people or fewer.

Managing the physical layer and its every connection point via managed connectivity can help network and data center managers confront the following issues:
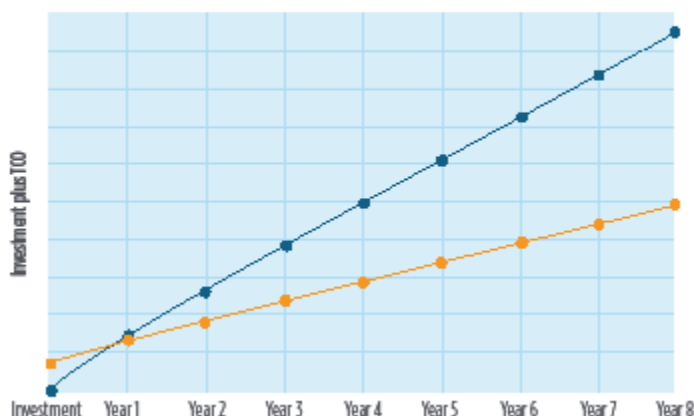
- **Security** Every organization must mitigate the risk of network intrusion to prevent compromise of critical business information.
- **High Availability** Today's networks require uptime for business continuity, but network and data center managers currently lack visibility of the physical layer.
- **Operating Expense** The high cost associated with physical layer maintenance has a direct impact on operating expenses. Accurate knowledge of physical layer topology leads to less network issues and faster resolution of problems.
- **Compliance** There are a variety of government regulations, compliance and reporting requirements regarding how an organization's data is accessed, transacted and stored. Existing network management tools do not enable intrusion detection

and logging of events as related to physical layer connections—only Managed Connectivity solutions have that ability.

- **Capacity and Scale** The ever-increasing amount of data and number of devices on the network continues to drive complexity in the physical layer. It is more critical than ever to deploy solutions that allow for flexibility and efficient use of assets.

By managing all connections and changes in the network, network and data center managers can easily see the topology mapping and status of a connection. The time required for a standard network MAC or diagnosis can be cut in half, improving meantime to response, ensuring quality of service and reducing operating expense. As shown in Figure 1, TE's managed connectivity pays for itself within the first two years.

Figure 1

Managed Connectivity Solution

Part of the portfolio of TE's Managed Connectivity Solution, Quareo, is the only solution available that uses connection point identification technology to track specific information about each connector and cable in the physical layer.

Quareo utilizes microchips that are embedded in the connectors of TE's high-performance copper and fiber network cabling solutions. These microchips have information related to the cable itself, as well as unique identifiers for each connection point in the network. Quareo can identify everything from port location and circuit length, to polarity, cable type, color and manufacturing information. It also is the only solution with the capability of monitoring both the front and rear of a patch panel. This enables monitoring cable connections that come into the back of the patch panel, as well as connections within the cross-connect and to the switch and servers, offering customers the ability to trace end-to-end connections from the computer to the switch. Using a standard form factor and footprint, Quareo solutions are easily deployed in existing fiber and copper networks. With a comprehensive product portfolio, Quareo can accommodate both fiber and copper applications from the

simplest LAN environment, all the way to the most highly dense, complex data center environment

Infrastructure Configuration Manager (ICM) Software

Infrastructure Configuration Manager (ICM) is a software application designed to document and administer both passive and active network connectivity infrastructure, and is specifically designed for customers of TE's Managed Connectivity Solutions. ICM powers TE's advanced Quareo connection point identification technology, providing customers with a single platform for both solutions.

ICM creates an automated, accurate, real-time physical layer management system that is designed to explore, discover and map all the connections of the network, allowing data center and network managers to simplify the process of all moves, adds and changes, improve security and reduce operating expense.

TE's Managed Connectivity Solutions, enabled by ICM, help customers eliminate time-consuming manual work order processes, easily identify and locate specific ports, auto-discover IP assets, and trace data center circuits from the switch through the cross-connect to the server.

The systems also help maximize network investment by identifying under-utilized assets and improving security through real-time monitoring and programmable alerts.

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6.4- Video Distribution over Twisted Pair

TE's Video Distribution System (VDS) enables network managers to deliver true high-definition RF and IP video over a Category 6, 6A, or 7 twisted pair cabling infrastructure without the need for coaxial horizontal cabling or any RF tuning.

VDS enables the delivery of video signals such as cable television, satellite, in-house video, digital signage, electronic bulletin boards or any other service normally delivered over coaxial system – but over a twisted pair infrastructure.

This solution is the answer for medium to large hotels and resorts needs in terms of video distribution for in-room services, lobby areas, gym and entertainment spaces.

VDS is a TIA-568/ISO 11801 compliant solution that provides these key benefits:

* Provides full RF video spectrum, along with IP video, over a single Cat 6/7 cable
* Auto adjusting RF signal eliminates the need for manual tuning
* Plug-and-play components provide ease of installation and system design/maintenance
* Head-end output is automatically adjusted for proper system operation
* Powered over cable – the remote active balun is powered over the twisted pair system

*Bi-directional signaling compatible with interactive control requirements
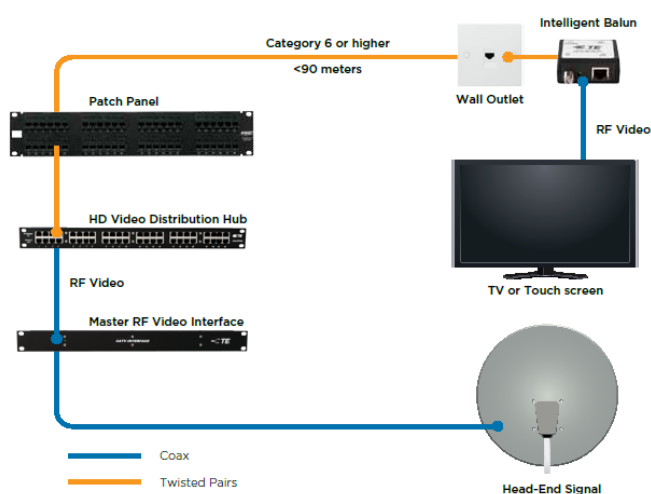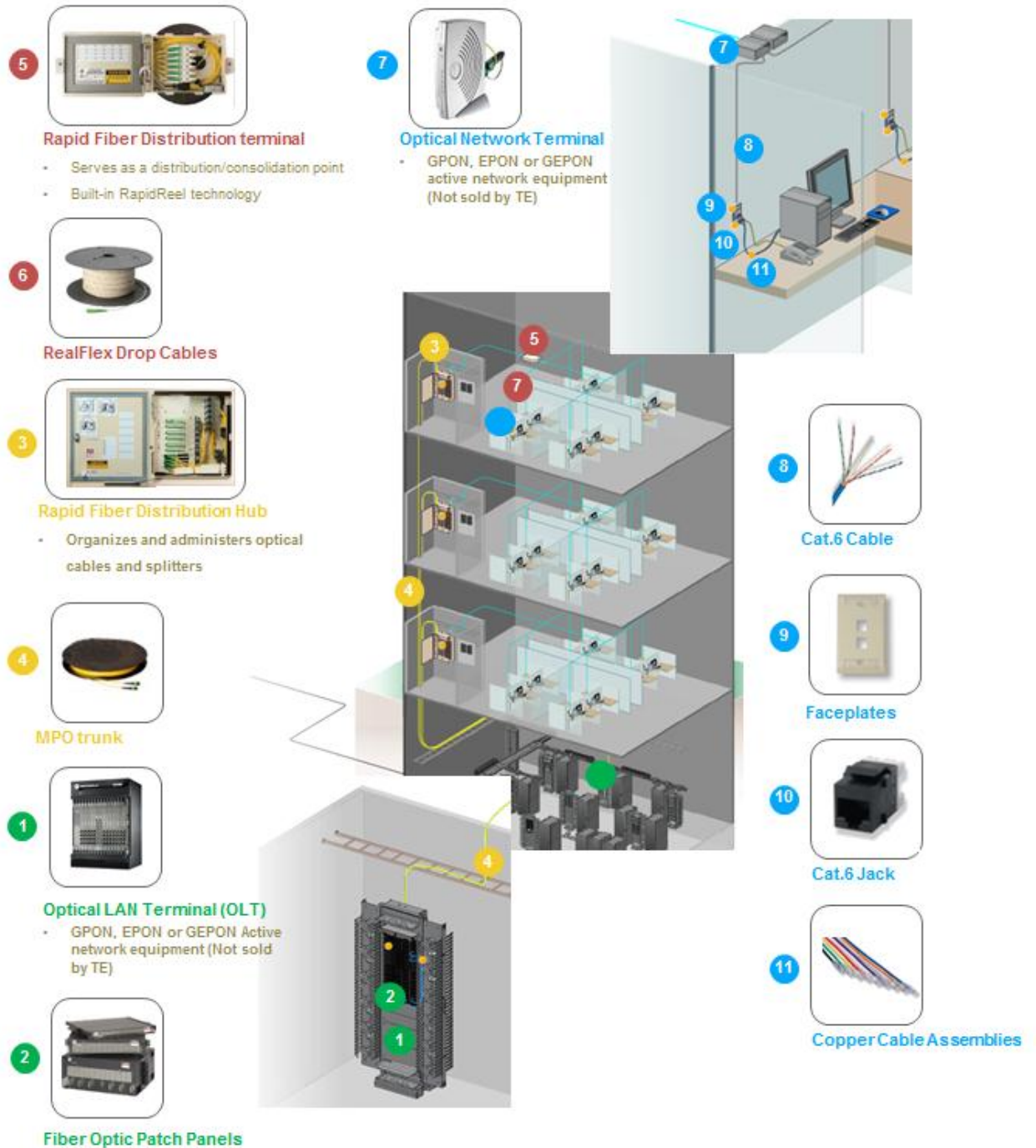
6.4- Passive Optical LAN

Because an airport is a city within a city with long distance from one point to another with a high degree of background noise, fiber optic solutions help overcome these challenges. Of course, we can use fiber optic to build the campus and backbone in the terminals, landside and airside. But today, with Passive Optical LAN solution, we can build a end-to-end fiber optic infrastructure, from the data center (Equipment room) to users (Desktop or any IP devices) in a very cost effective manner.

A Passive Optical LAN is a point-to-multipoint architecture that employs unpowered optical splitters that enable a single strand of singlemode optical fiber to serve multiple users. At each end, you have an Optical Line Terminal (OLT) based in the data center or equipment room and an Optical Network Terminal (ONT) at the user locations. Downstream signals are directed to multiple users using the splitter technology. Upstream signals are combined using multiple access protocol by using the splitter in the opposite direction. A PON takes advantage of wavelength division multiplexing (WDM), using one wavelength for downstream traffic and another for upstream.

In a POL, the OLT provides the interface between the building core router and the passive infrastructure POL. The ONT is a device that terminates the POL and converts the signal to one or more twisted-pair outputs to interface with the Internet protocol (IP) enabled network devices, including IP phones, computers, card readers, cameras, Wireless access points (WAP's) using a standard RJ45 connection. A POL is a shared network – the OLT sends a single stream of downstream traffic that is seen by all ONT's. Each ONT only reads the content of those packets that are addressed to it. Encryption is used to prevent eavesdropping on downstream traffic.

Passive Optical LAN
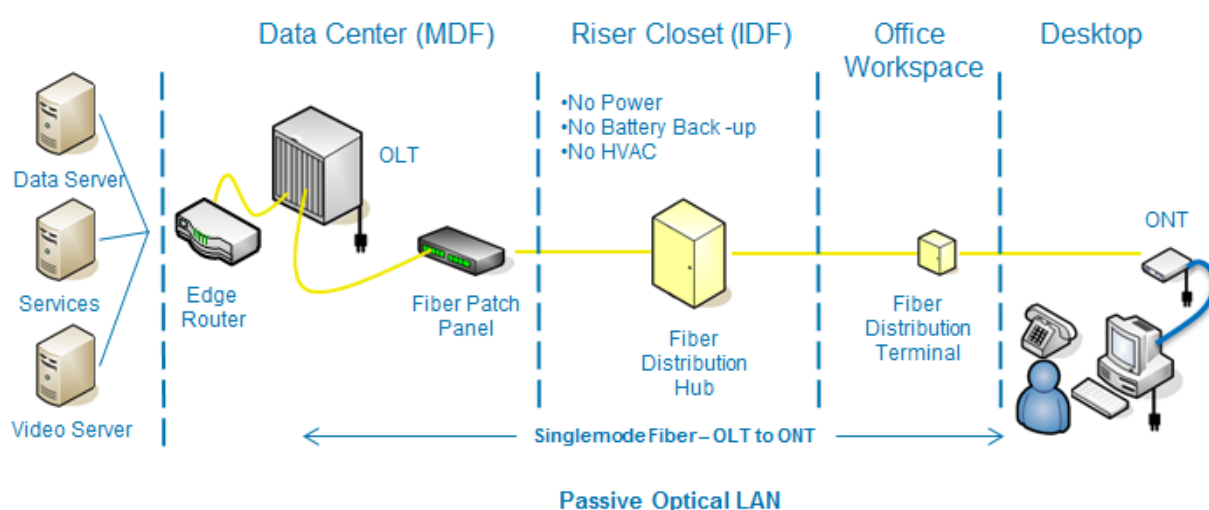
TE's Optical LAN Solution (OLS) is an enterprise POL architecture that leverages the distance and bandwidth capabilities of single mode fiber to deliver converged voice, video, data, and building automation over a single strand of fiber. OLS enables efficient management and utilization of bandwidth and offers measurable OpEx and CapEx savings and 'green' benefits.

5 Rapid Fiber Distribution terminal
- Serves as a distribution/consolidation point
- Built-in RapidReel technology

6 RealFlex Drop Cables

3 Rapid Fiber Distribution Hub
- Organizes and administers optical cables and splitters

4 MPO trunk

1 Optical LAN Terminal (OLT)
- GPON, EPON or GEPON Active network equipment (Not sold by TE)

2 Fiber Optic Patch Panels

7 Optical Network Terminal
- GPON, EPON or GEPON active network equipment (Not sold by TE)

8 Cat.6 Cable

9 Faceplates

10 Cat.6 Jack

11 Copper Cable Assemblies

6.5- Distributed Antenna Systems (DAS)

With the increasing popularity of wireless devices, mobile operators' customers expect to have coverage anytime and anywhere within airports. This capability requires increasing indoor network capacity across the premises.

TE's advanced wireless solutions create a leading platform for serving wireless services providers inside schools or universities. Our unified architecture for every application in the micro cellular space delivers coverage and capacity to match your needs. The InterReach* solution operates as a seamless extension of the wireless network, expanding the reach of signals throughout any education infrastructure size.


InterReach Spectrum solution

7. About TE connectivity

The Global Network of TE Connectivity Labs

TE, a leading global technology provider of network solutions, has designed and engineered many options to support future data speeds in Local Area Networks. We have developed a technology matrix that provides IT administrators with a clear overview of available technology. Extensive laboratory research needed to support existing and emerging applications, combined with many years of experience in development for global telecommunication providers results in superior solutions for 10 Gigabit Ethernet over copper and fiber.
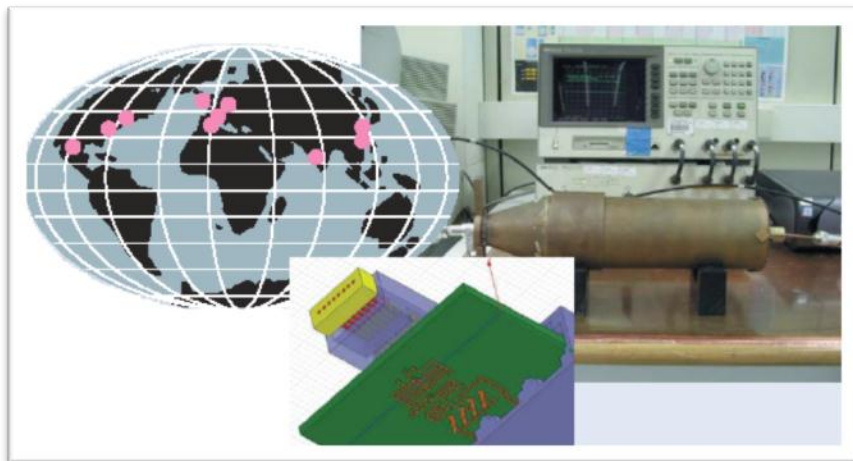
Design and High-Tech development

TE uses extremely new development tools to provide functional and reliable products. By using software simulation programming and extensive modeling, we are able to ensure the best possible product performance.
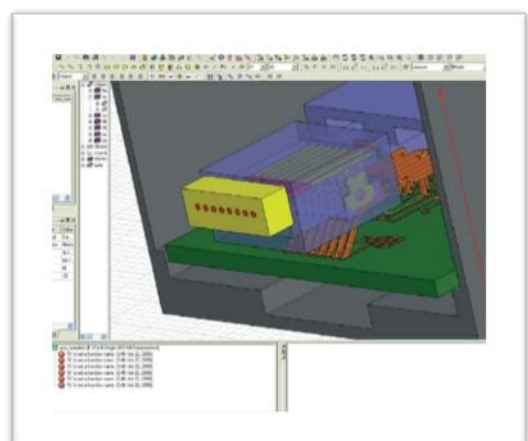
TE's Standards Leadership

Today's standards activities drive tomorrow's new products and applications. TE participates in more than 600 different global and regional standards bodies. In fact, TE contributed and participated in all the standards committees involved in creating the application, component and systems standards for 10GBASE-T. TE is leading efforts in IEEE, ISO/IEC, CENELEC and TIA that will define tomorrow's high speed transport technologies and we contribute actively to these with our innovation and research and by our standards leadership.

With three regional Enterprise Networks business unit research and development facilities around the globe, TE leads innovation in cabling infrastructure, enabling our customers to enjoy higher speeds developed according to their market.

- US$688 Million of annual RD&E investment worldwide in 2012
- New products accounted for 24% of sales over the last 3 years
- Around 7,400 engineers globally
- Over 20,000 patents issued or pending

TEOA – TE's Operating Advantage

TEOA, a six sigma-like standard established internally by TE for enhancing productivity, product engineering and quality, has helped to ensure TE products are nearly flawless. Setting the bar high and ensuring customer satisfaction with premium products that meet or exceed industry standards is our goal.

Backed by a 25-year performance warranty, TE's XG cabling solutions are fully compliant to Category 6A performance specifications as defined by ANSI/TIA 568-C.2. Our XG shielded systems also meet both IEEE 802.3an 10GBASE-T and ISO/IEC 11801 Class EA requirements for 4-connector 100-meter channels.

Managing Environmental Impacts

Our efforts to reduce our environmental impact reflect our core values of taking responsibility and doing the right thing and underscore our commitment to being a good corporate citizen in the communities where we do business.

In all of the countries where we operate, we hold ourselves to a high standard — often above local requirements and practice — and we are committed to continuous improvement.

To meet our goal of reducing our environmental impacts by 10% by 2012 we will:

- Measure and report our progress as part of our regular monthly review of operational performance
- Use operational improvement tools and programs to reduce the amount of resources we use and the amount of waste we generate
- Engage employees in our efforts
- Identify and apply best practices for reducing environmental impacts in common processes at TE

More than 60 of TE's sites have their environmental management systems (EMS) certified to ISO 14001 by third parties. To achieve certification, a facility must demonstrate that it has an EMS in place that identifies significant environmental impacts, sets goals and targets, and has a robust system for evaluating performance, taking corrective actions where needed, checking status on an ongoing basis, and continually improving performance.

To learn more about TE Connectivity engagement and actions, please visit:
http://www.te.com/en/about-te/responsibility/environment.html

Our Global Partner Network is Your Local Advantage

TE Connectivity has a network of over 1,700 authorized TE Network Design and Installation (ND&I) partners in 59 countries

With over 90,000 employees, including 7,400 engineers, in over 50 countries, we can support your company wherever it chooses to go. With knowledge and experience comes understanding. We understand the issues with data center and office networks and what customers are facing. It is why we developed the solutions you need for your technology investment.

TE has global supply chain capabilities and logistics support, with an extensive network of industry-leading distributors to stock Enterprise products locally in locations around the globe. In addition, over 150 TE Connectivity owned warehouses provide additional stocking flexibility.

Conclusion

Airports are challenging and complex environments. From small airports to aerotropolies the IT network infrastructure plays the role of strategic asset to enable the correct level of support of the various business operations. Good planning of network strategies can deliver great benefits in reducing the level of complexity while boosting efficiency.
Moving from airside to landside and over to terminal areas airports IT managers need to think of the best possible way to maintain high level of service.
With more than 60 years of experience engineering better cabling, components or connections, we can help you build, maintain or expand the network infrastructure of your airport.

From data centers and office networks, to managed connectivity for better network control and wireless solutions, TE is a global leader in the design and manufacturing of high-performance, reliable, scalable end-to-end cabling and connectivity solutions. Standards-based, and interoperable, our product portfolio is the most extensive in the industry.