Enabling the Connected Lifestyle
Infrastructure Perspective

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In the course of my Presentation...

DRIVING TRENDS → ENABLING IoT → BUILDING APPLICATIONS → PROVISION INFRASTRUCTURE
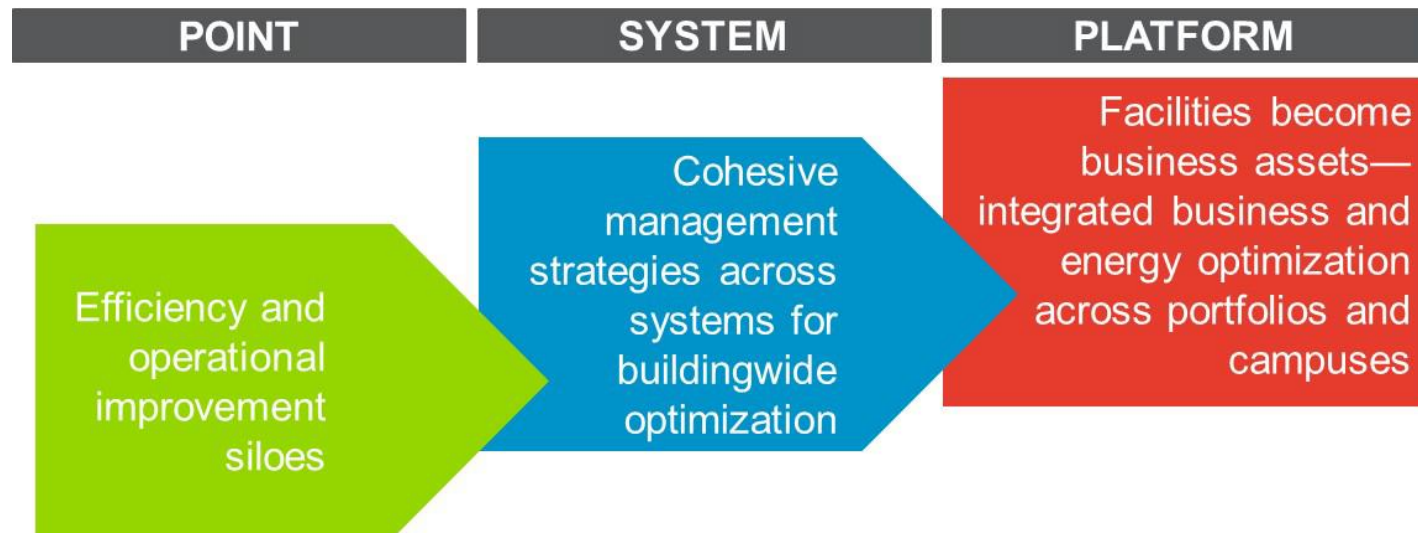
EVOLVING STANDARDS

Driving Trends

Trend 1 – Total Cost of Ownership

Integrating IT into business operations set to redefine Building Owners and Executives their IoT capabilities

- Business asset – reduce the operating cost
- Evolutions in technology, delivery models, and customer

POINT	SYSTEM	PLATFORM
Efficiency and operational improvement siloes	Cohesive management strategies across systems for buildingwide optimization	Facilities become business assets—integrated business and energy optimization across portfolios and campuses

(Source: Navigant Research)

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Trend 2 – Digital Building & Venue

Critical Dynamics Shaping Digital Transformation of Buildings

|	VENDORS	UTILITIES	CUSTOMERS
WHO	Executive management, strategic marketing, product development	Executive management, program managers, marketing, education, outreach	Building owners, facilities and energy management, sustainability
WHAT	Technology revolution to transform component offerings to platform solutions	Transformational opportunity to redefine offerings beyond energy supply to enhance customer satisfaction with deeper and ongoing engagement	Data-driven insight for CAPEX/OPEX strategy and management, risk mitigation, reporting and regulatory compliance, new revenue
HOW	Partnerships are critical to leverage domain expertise and positional strength in the value chain	White label technology offerings, integrated energy efficiency and advisory engagements, performance-based incentives	IoT investment, energy efficiency retrofits, SaaS deployment, turnkey advisory engagements
VALUE	New business models and offerings translate to new revenue, stronger margins, cleaner corporate footprint	New revenue streams for utilities in an era of industry disruption and threats against the traditional business model	Energy cost savings, revenue from energy generation and transaction, reduction in OPEX, redefined asset valuation

(Source: Navigant Research)

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Trend 3 – Data & Power Ports

IoT driving 12-17% annual growth in fixed line devices through 2020 (PoE port growth 64m/2010 to 136m/2016)[2]

- Network extends into non-traditional IT environments (factories, warehouses, etc)
- Growing overlap between facility and IT systems
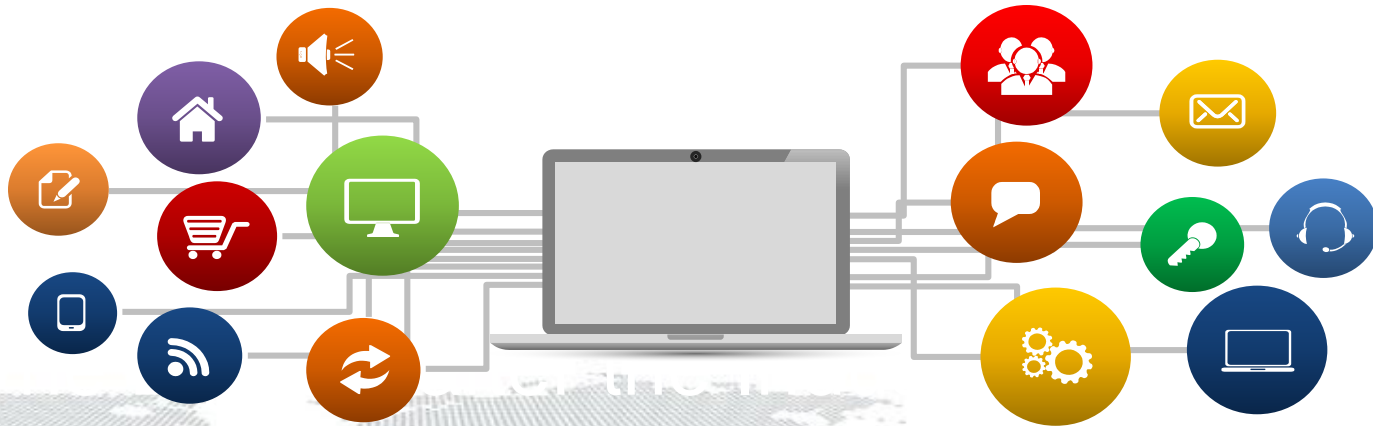
Trend 4 – Evolving Ecosystem

Digital India -

- A flagship programme of the Government of India with a vision to transform India into a digitally empowered society and knowledge economy

> **Digital Infrastructure as a core Utility to every citizen**

↓

> **Governance and Services on Demand**

↓

> **Digital Empowerment of Citizens**

(Source: http://www.digitalindia.gov.in)

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ENABLING IoT

Enabler 1 – Trifecta

Cheap sensors
Current = $.60
2007 =$1.30

Cheap bandwidth
Decreased = 40X over the past 10 yrs.

Cheap processing
Decreased = 60X over the past 10 yrs.

(Source: Goldman Sachs Global Investment Research, IoT

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Enabler 2 - Wireless

- LTE Plays Vital role in the success of IoT
- LTE enabled Devices – Consumer electronics, M2M Space etc.
- 5G - Shifting from an Industry Vision to a tangible Next Generation Technologies

| 10 GBPS | DENSER NETWORKS & | 5G TRIALS AND |
| PER USER | SUPER-LOW LATENCY SPEEDS | PRE-STANDARD DEPLOYMENTS |

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Enabler 2 - Wireless

- **Ubiquitous Wi-Fi coverage** – Connectivity is available for free or at a very low cost

- **Wi-Fi beats LTE** - given Wi-Fi utilizes unlicensed spectrum, it does not require monthly access fees to a carrier.

- Increasing number of People believe that **"WiFi is a human right"** (?)

Ratification
802.11 ac

Future
802.11 ax

FREE Wi Fi

(image – TripAdvisor)

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Enabler 3 - Smartphone

- Personal gateway to the IoT, serving as a remote control or hub for the connected home, connected car, or the health and fitness devices consumers are increasingly starting to wear.

- Global Mobile Data Traffic
  - Grew 63% in 2016
  - Projected to grow another 8 folds by 2021

  Source: Cisco VNI Mobile, 2017

(image – http://boostandco.com/news/wifi-trends-2017/)

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Enabler 4 - Big Data

Big data – As the IoT will by definition generate voluminous amounts of unstructured data, the availability of big data analytics will continue to grow
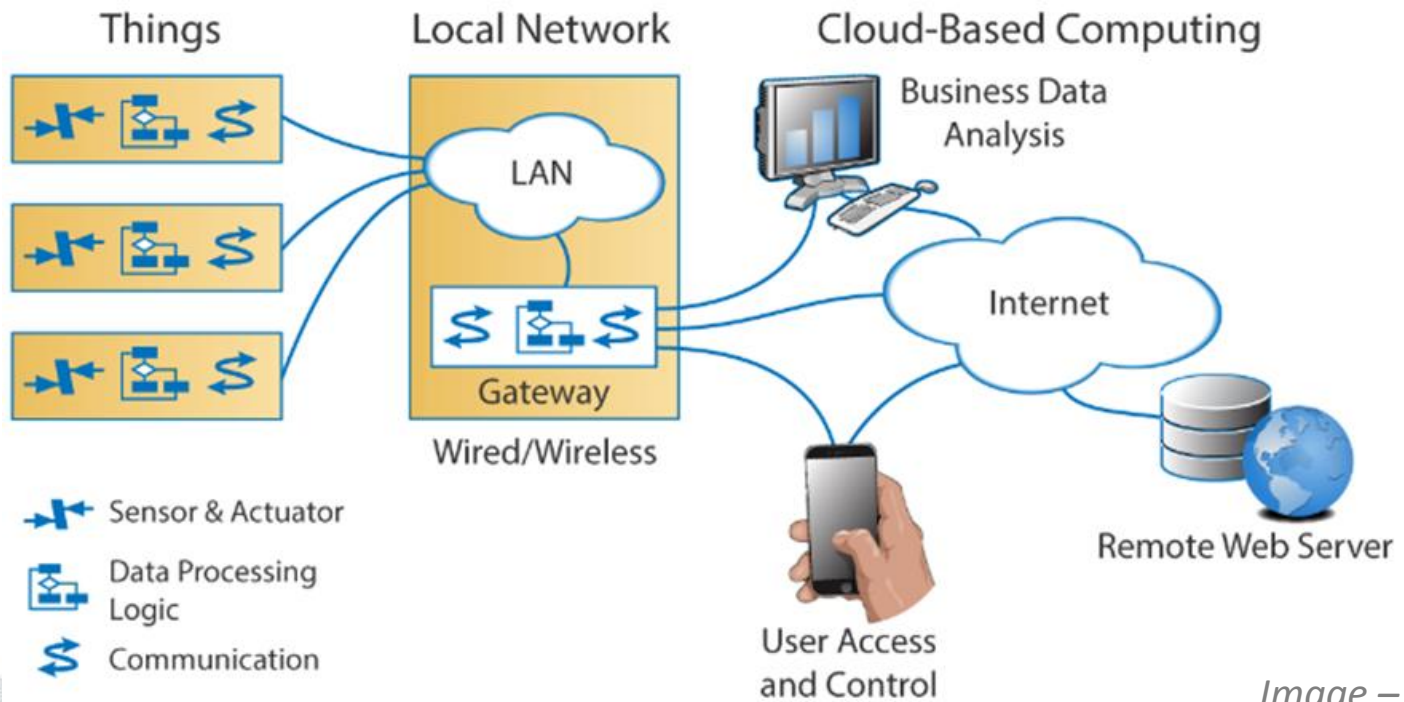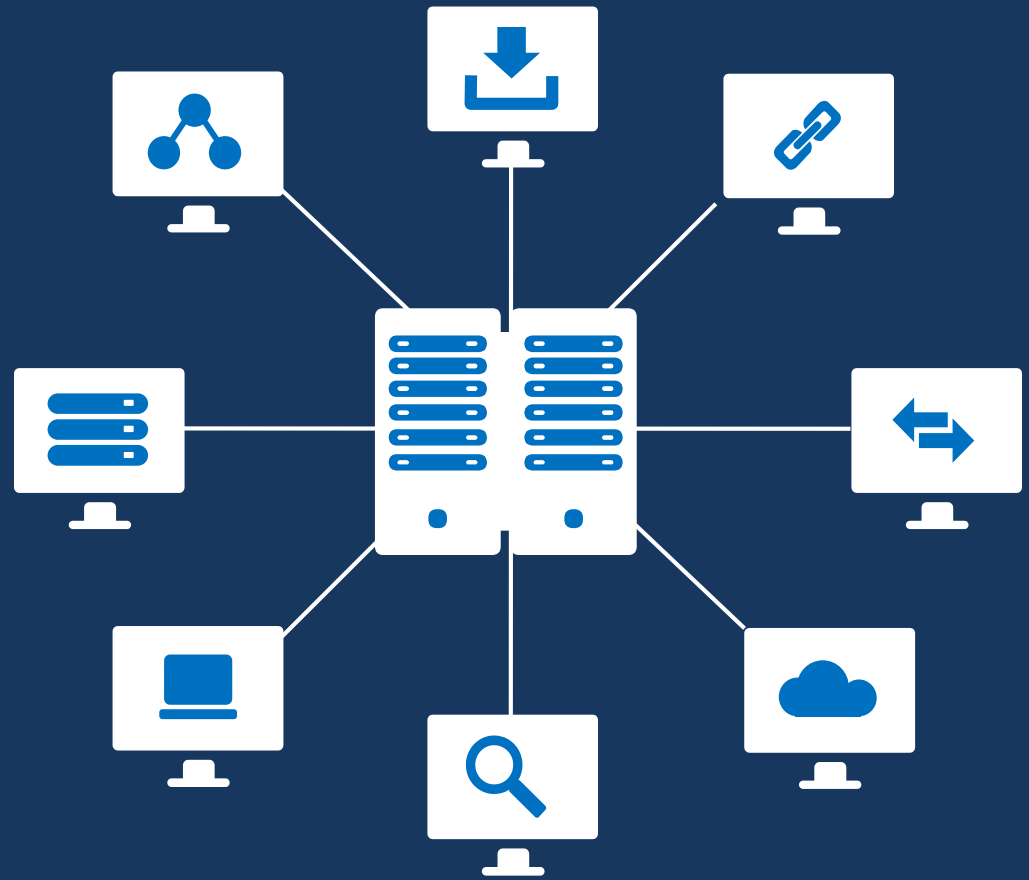

Image – Opto 22

Building Applications

1. Electronic Safety & Security

- **Access Control**
- **Video Surveillance**
- **Intrusion Detection**
- **Fire Alarm and Protection**

To Manange **Unauthorized Access by Authorized Person –** Physical security **is less effective**

AIM is an invaluable tool - immediate & auto detection of newly- added rogue unauthorized devices, including their physical location.

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2. Integrated Building Automation

- **Building Automation Systems**
  - HVAC
  - EMS
  - Lighting Control
  - Window and Shade Controls
  - Digital Signage

Common infrastructure offers a cost-effective means of supporting many diverse applications. It is also ready to accommodate new and emerging applications— whether wired or wireless

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3. Audio/Visuals & HDBASE-T

- **HDBASE-T**
- Allows one Cat 6A cable to support transmission of
  - Uncompressed ultra- HD video and audio, including 4K
  - 100BASE-TX Ethernet
  - Device control
  - Power over HDBaseT (PoH), up to 100 watts of dc power
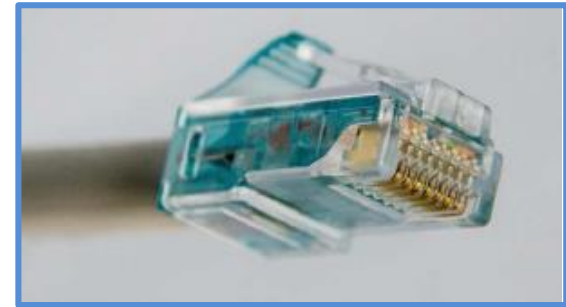
HDBaseT
Audiovisual

HDBaseT
Automotive

HDBaseT
Industrial

HDBaseT
Consumer

(image –http://hdbaset.org/)

Works on universal interface of RJ-45 and is being standardized on IEEE 1911

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4. *Wireless (Wi-Fi & IBW)*

- Plan it as a UTILITY
- Wi-Fi Network OR Cellular Network – Its MUST

Structured Cabling

In-Building Wireless

Small Cell

- Need Power – PoE, PoE+, PoE++
- Need Planning – Grid Network spread across the facility
- Need Bandwidth – 2.5 Gbps, 5 Gbps, 10Gbps

Cabling is Critical for Effective Wireless Network – Cat 6A, SM & MM Fiber, Coax

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5. Power Over Ethernet

- 4-Pair High Power Target Markets (Source – IEEE CFI)

Markets	Typical Power Consumption	Cabling Recommendations
Nurse Call System - Healthcare	**80% Market Needs > 30W**	• **Category 6A** for new installations • Avoid conditions that result in temperature rise > 15 C Based on maximum 45 C ambient and 60 C cable rating • Minimize cable bundling • Use open wire trays or similar* • Consider mixing powered/unpowered cabling in bundles • Consider bundle separation techniques
Building Management etc.	**40-50W**	
IP Security Cameras (PTZ)	**30-60W**	
Industrial	**> 30W**	
IP Turrets – BFSI Phone systems	**Typically 45W**	

* An addendum to TIA-569D to cover pathways and spaces considerations for remote powering is being developed

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Provision Infrastructure

Provision | Density

Number Of Devices (Things)

- Anticipation for at least next 10 years

- machines, sensors, cameras, controllers, drives etc

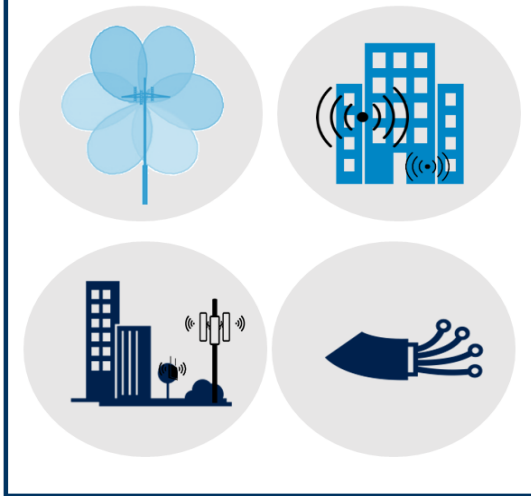| Enhanced Mobile Broadband	Massive Machine to Machine Computing	High Reliability, Low Latency

Provision | Bandwidth

Bandwidth Consumers

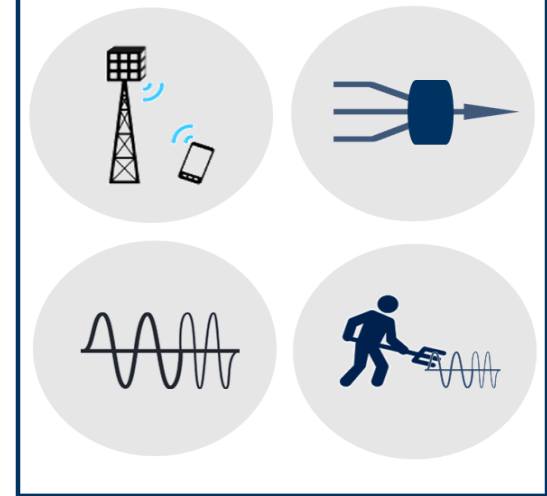- Traffic flow help determine Bandwidth needs
- Device capacities & data rates

Densification

Virtualization

Optimization

Provision | Downtime Mitigation

Downtime

- – What is the cost of downtime?

- – Resiliency and protection

- – Design Architectures

NETWORK

BIG DATA

BUSINESS

END DEVICES

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Provision | Network Management

Network Management – Cabling Infrastructure

– Up-to- date documentations

– Easy Move Add Changes, Security alerts etc.

– Automated Infrastructure Management (AIM)

IEC **ISO**

DESIGN   **INSTALL**   **COMMISSION**   **OPTIMIZE**   **DOCUMENT**

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Evolving Standards
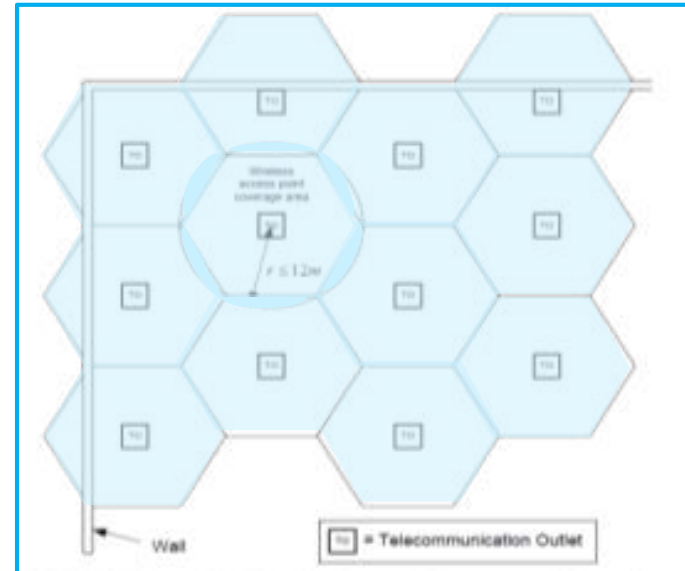
Standards | Alliances & Protocols

Standards | TIA , ISO/IEC
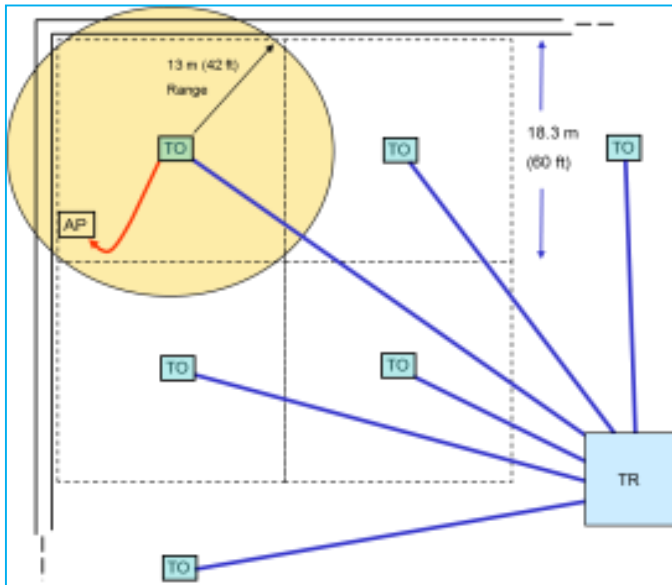
TIA TSB-162-A:

Cabling Guidelines for Wireless Access Points

ISO/IEC TR 24704:

Customer Premises Cabling for Wireless Access Points

Standards | TIA

Education
TIA 4966

Healthcare
TIA 1179

Intelligent Buildings
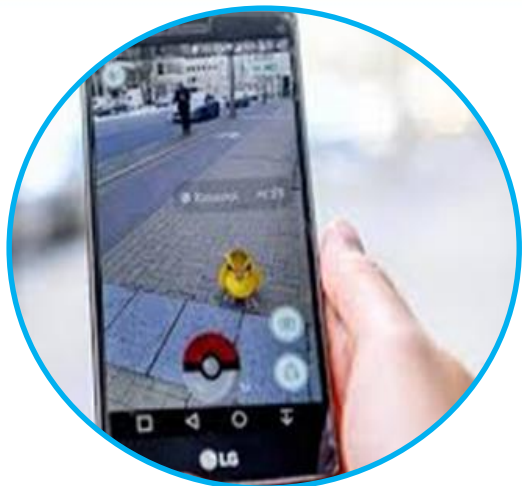TIA 862-B draft

WiFi
TIA TSB-162

PoE
TIA TSB-184-A

Data Centers
TIA 942-A

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Summary

1 Communication is the basis of Connected Lifestyle

2 The Connectivity requirements are changing

3 Drivers of Change – IoT, Wireless, Intelligence and Management

4 There is a Need for Speed

5 Choose an Infrastructure which is Simple, Efficient, Agile and Scalable

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Thank You