The IoT Revolution

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Field Application Engineer COMMSCOPE
Athens, 15th November 2019

Speaker introduction, who I am

DAVIDE BADIALI
Field Application Engineering Italy, Greece & Cyprus

COMMSCOPE®
Based in Milan, Italy

More than 18 years within the ICT Industry

- Degree in telecommunication engineering
- Bicsi member, RCDD certification since 2006
- Member of CEI (*Comitato Elettrotecnico Italiano*):
  - CT 306, Interconnection of ICT equipment
  - CT 46, Copper communication cables
  - CT 48, Copper connecting hardware
  - SC 86A, Fibres and cables
  - SC 86B, Fibre optic interconnecting devices

https://www.linkedin.com/in/davidebadiali/

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CONNECTIVITY IS EVERYWHERE.

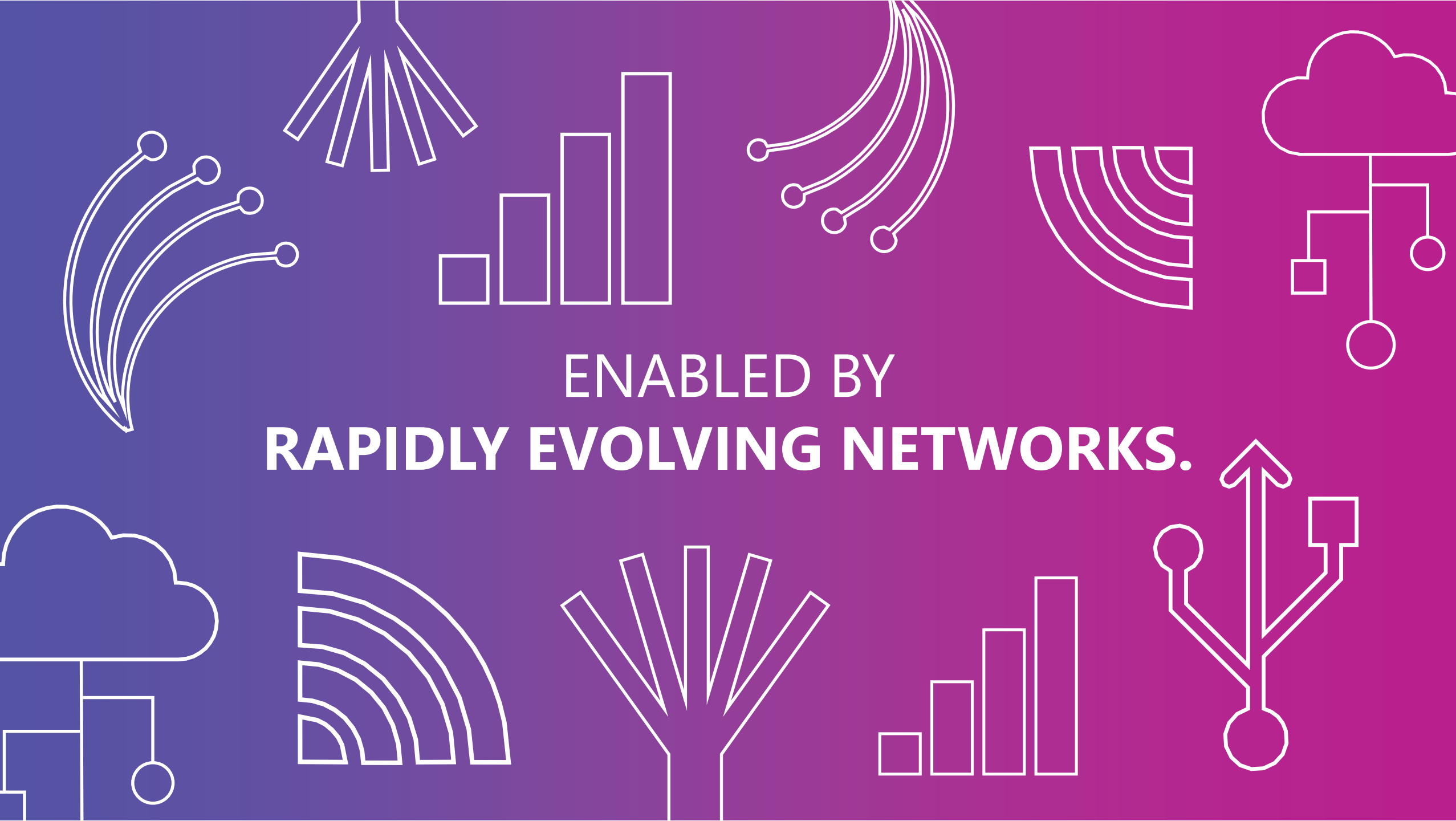
IN AN INTERNET MINUTE

3.7 MILLION
GOOGLE SEARCHES

266,000 HOURS
NETFLIX VIDEO WATCHED

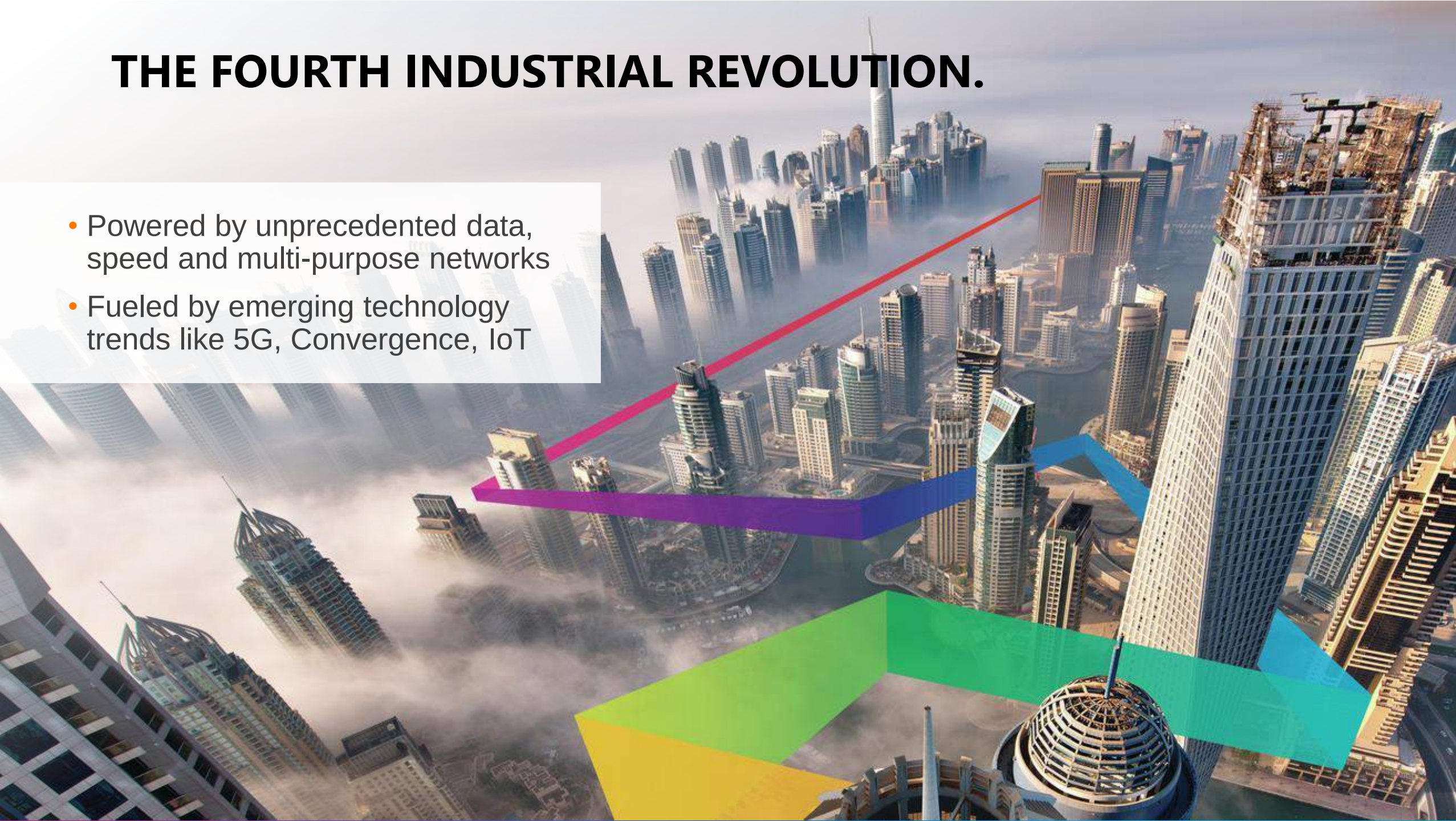
$900,000 USD
SPEND ONLINE

>1 MILLION
SWIPES


ENABLED BY
RAPIDLY EVOLVING NETWORKS.

THE FOURTH INDUSTRIAL REVOLUTION.

- Powered by unprecedented data, speed and multi-purpose networks
- Fueled by emerging technology trends like 5G, Convergence, IoT



Evolution of the Network

Wired Devices

Wireless Devices

IoT Devices

1970s

1990s

2010s

Local Area Network

Wireless Local Area Network

IoT Access Networks

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Devices & Applications Driving Networks

Connected Devices Are Expected To Reach 29 Billion In 2022

Connected Devices Are The Primary Driver Of Speed And Latency

Download Growth May Slow, Responsiveness Will Accelerate

2022 Connected Devices

2.1B **Wide-area IoT** (SigFox, LoRa, Ingenu)

1.6B **Short-range IoT** (Wi-Fi, Bluetooth, Zigbee)

1.7B **PC/Laptop/Tablet**

8.6B **Mobile Phones**

1.3B **Landline Phones**

Possible Future New Use Cases

Near-Term

- Smart Buildings/Cities
- Machine Learning
- Mobile VR/AR
- Wearables
- Connected Car

Longer-Term

- Autonomous vehicles
- Massive Industrial IoT
- Holographic Video
- AI Robots

Key Changes to watch

- 5G and Wi-Fi 6 adoption
- Latency improvements
- Network becoming more symmetric
- Ease of platform and application development will likely be a key factor in what use cases take off

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Customers Are Investing In Three Areas

Coverage & Connectivity: Broadband Accessibility

mmWAVE

ALLIANCE cbrs

lte

FTTx

5G

Capacity: Optimizing Network Infrastructure

Add radios, active antennas, and spectrum

Split sectors or Massive MIMO

Hyperscale & Cloud Data Centers

Multi-Use Fiber Networks

Deploy small cells/DAS

Fixed Wireless Access

Efficiency: Technology for Cost Efficient Networks

CRAN/SDN/Virtualization

Power over Ethernet

Fog Computing

Leaf Spine

Multi-mode fiber

VIRTUALIZATION - DENSIFICATION - OPTIMIZATION

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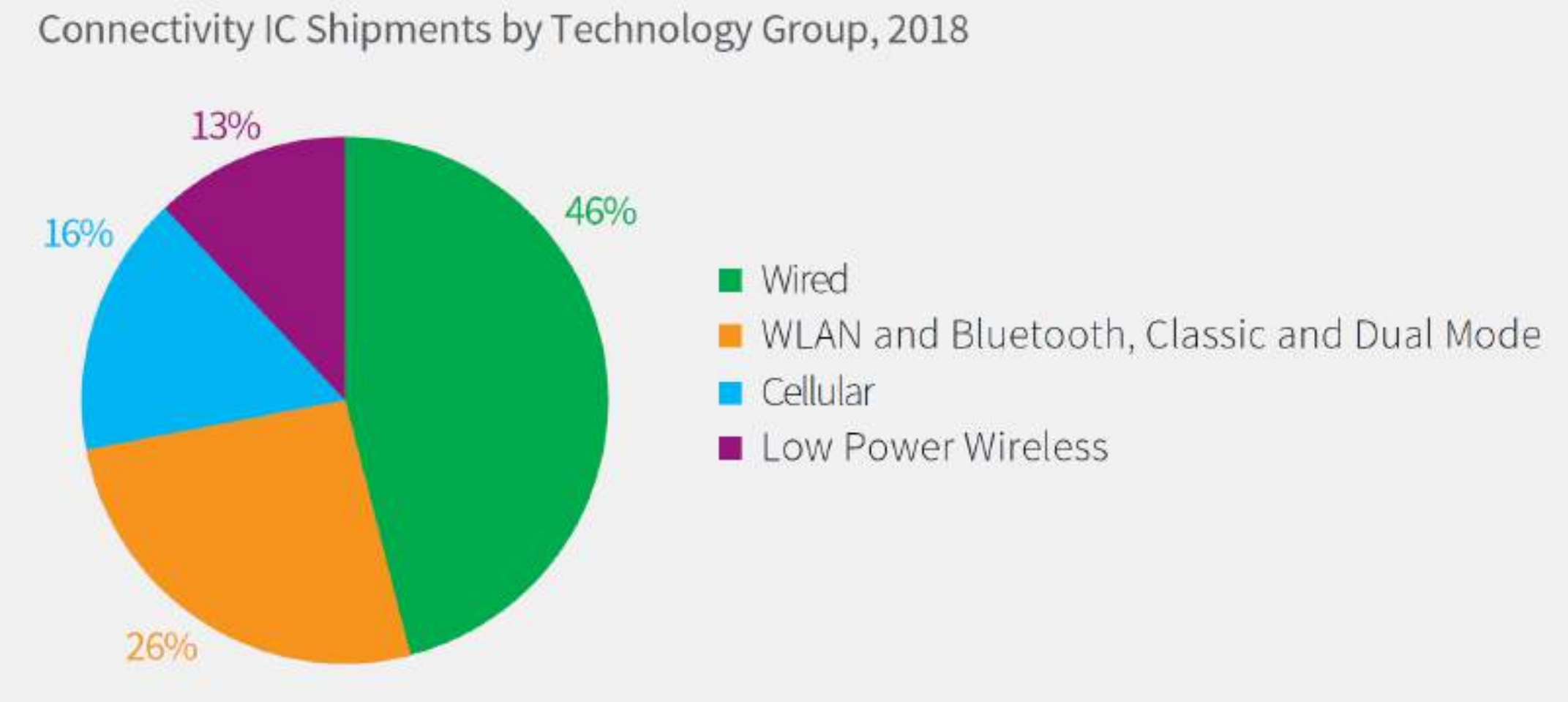
The Big Picture: Wired and wireless



Communication Systems: Everything Over Twisted Pair

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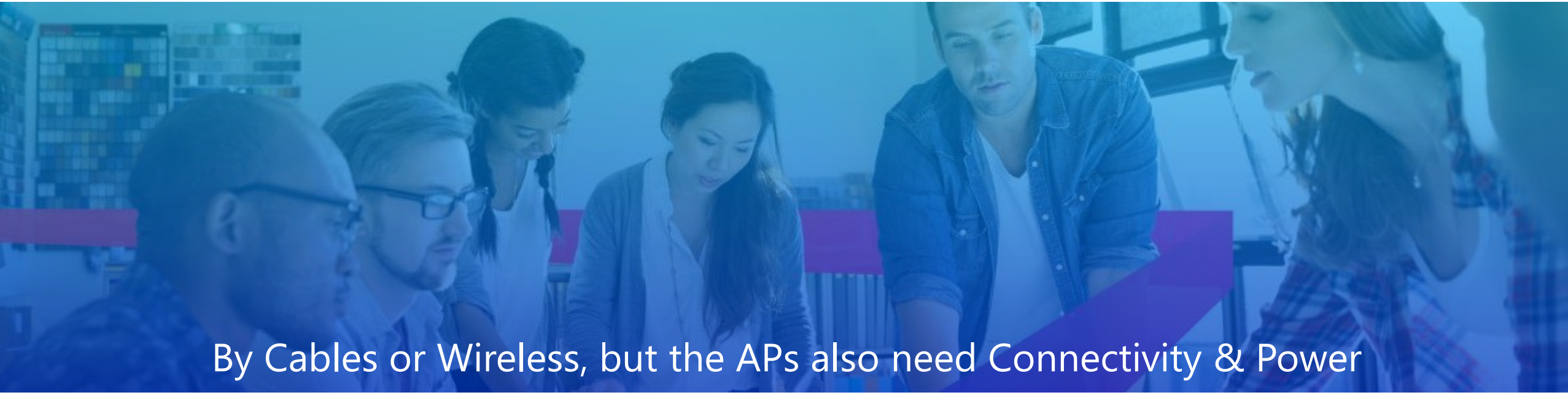
IoT— Multiple connectivity technologies



IEEE 802.15 · Wi Fi · Lte · ethernet alliance · sigfox

ZigBee · Bluetooth 4.0 · Z-WAVE · LoRa · WEIGHTLESS

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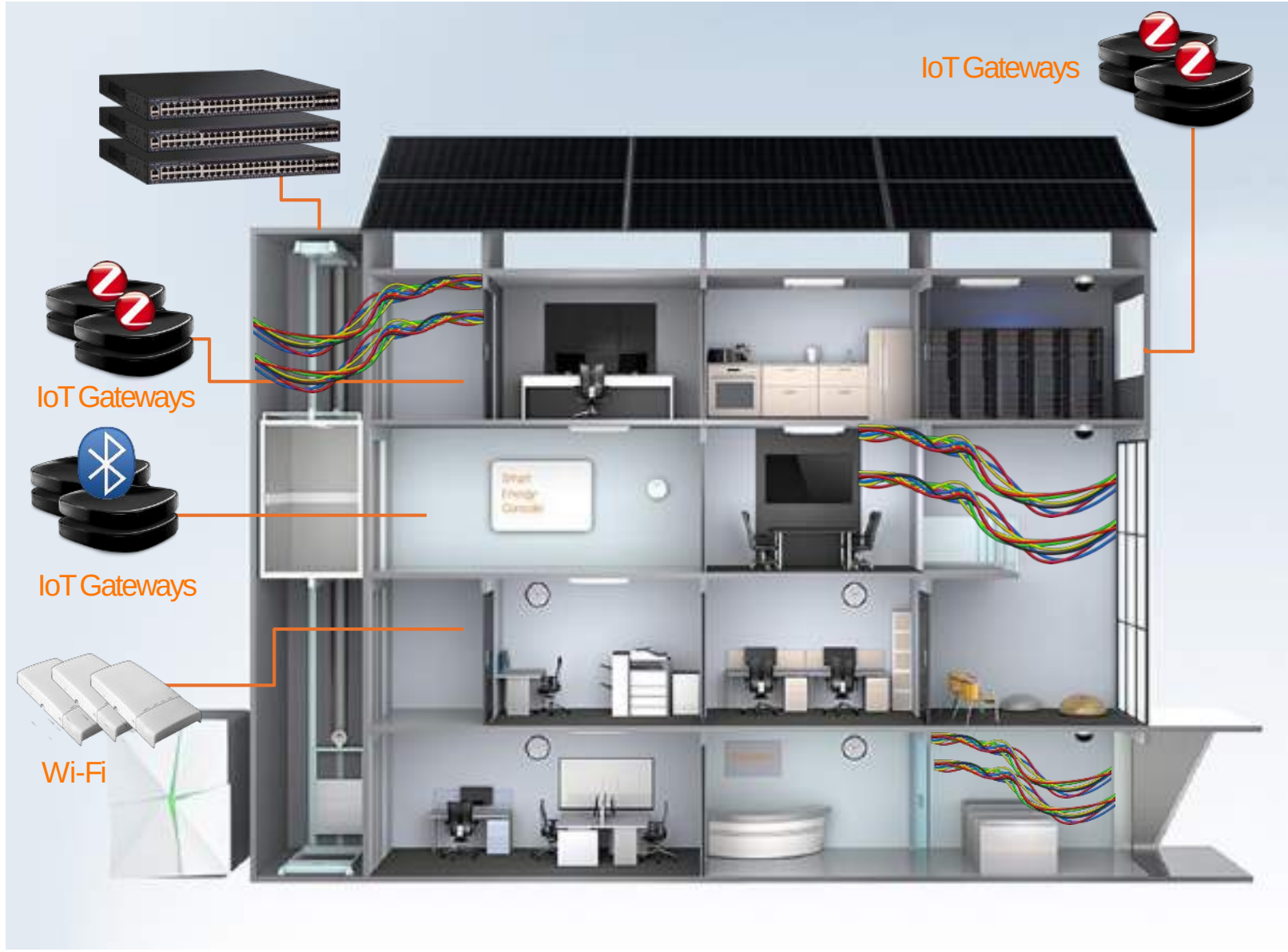
Every Silo Requires Duplicate Equipment

- Separate IoT Gateways
- More Switches
- More Cabling
- Separate Security
- High Costs = Questionable ROI



...Creating a Redundant Network Infrastructure

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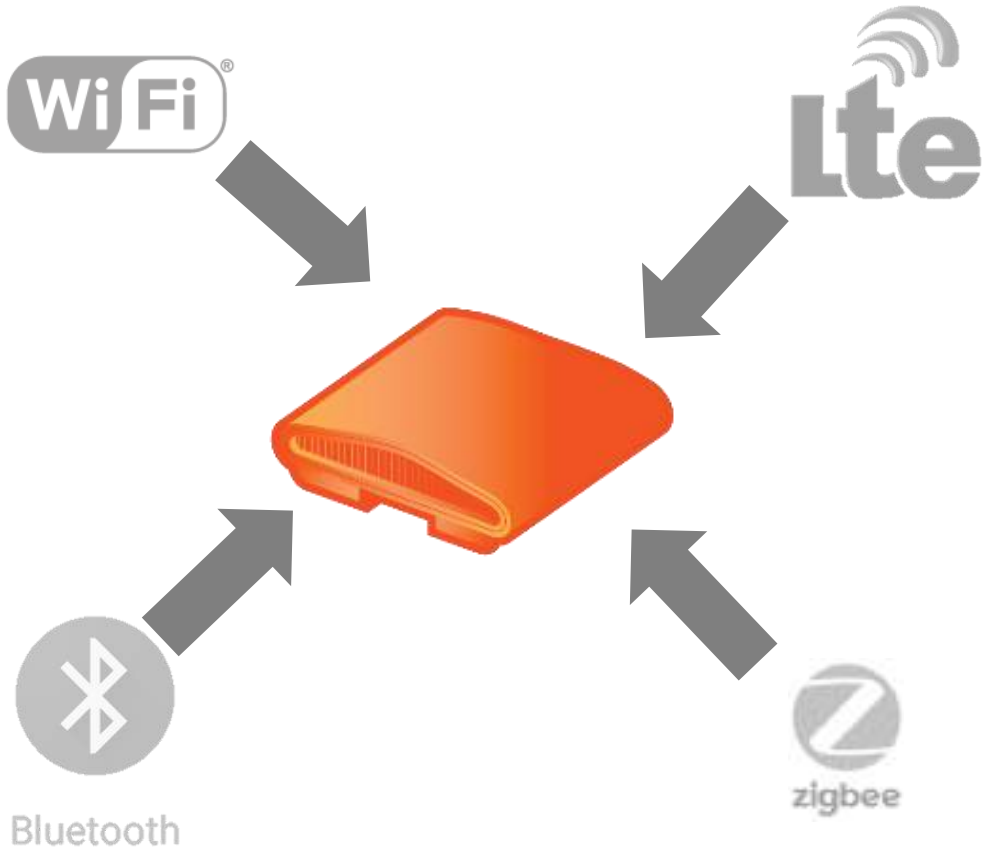
Converged Access Points / Wireless Converged



Converged APs

A multi-standard wireless access point (AP) that extends the traditional Wi-Fi only AP to include IoT and cellular wireless technologies.

Target Verticals Share Common Themes

Hospitality & MDU

Enhanced Safety

Education

Energy Management

Healthcare

Asset Tracking

Retail

Enhanced Experience

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Staff Alerts / Panic Buttons

Panic Button

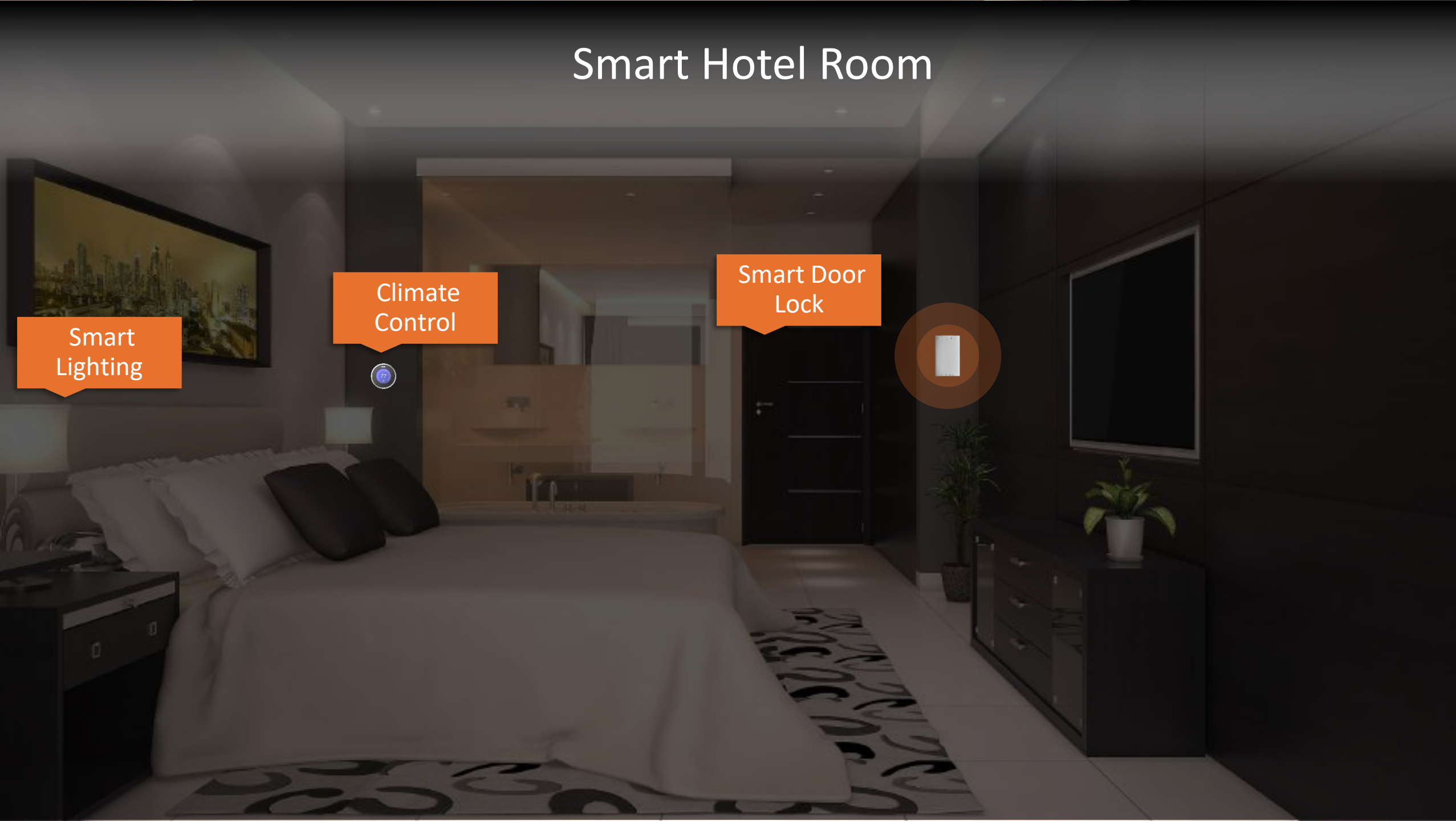
kontakt.io

TraknProtect

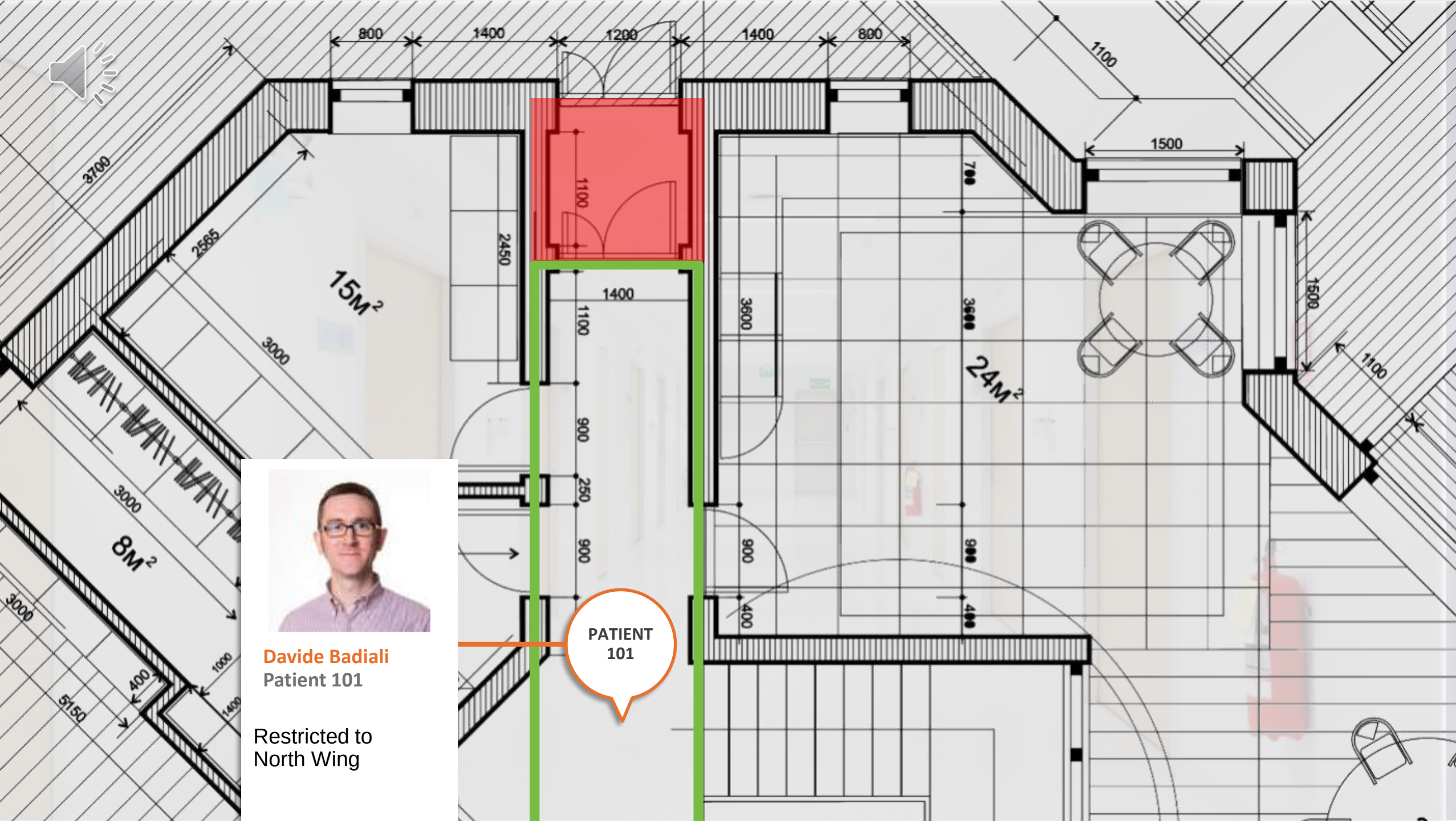
Small wearable panic buttons can send an alert to building security or to a preset list of notification devices.

HOSPITALITY

Smart Hotel Room

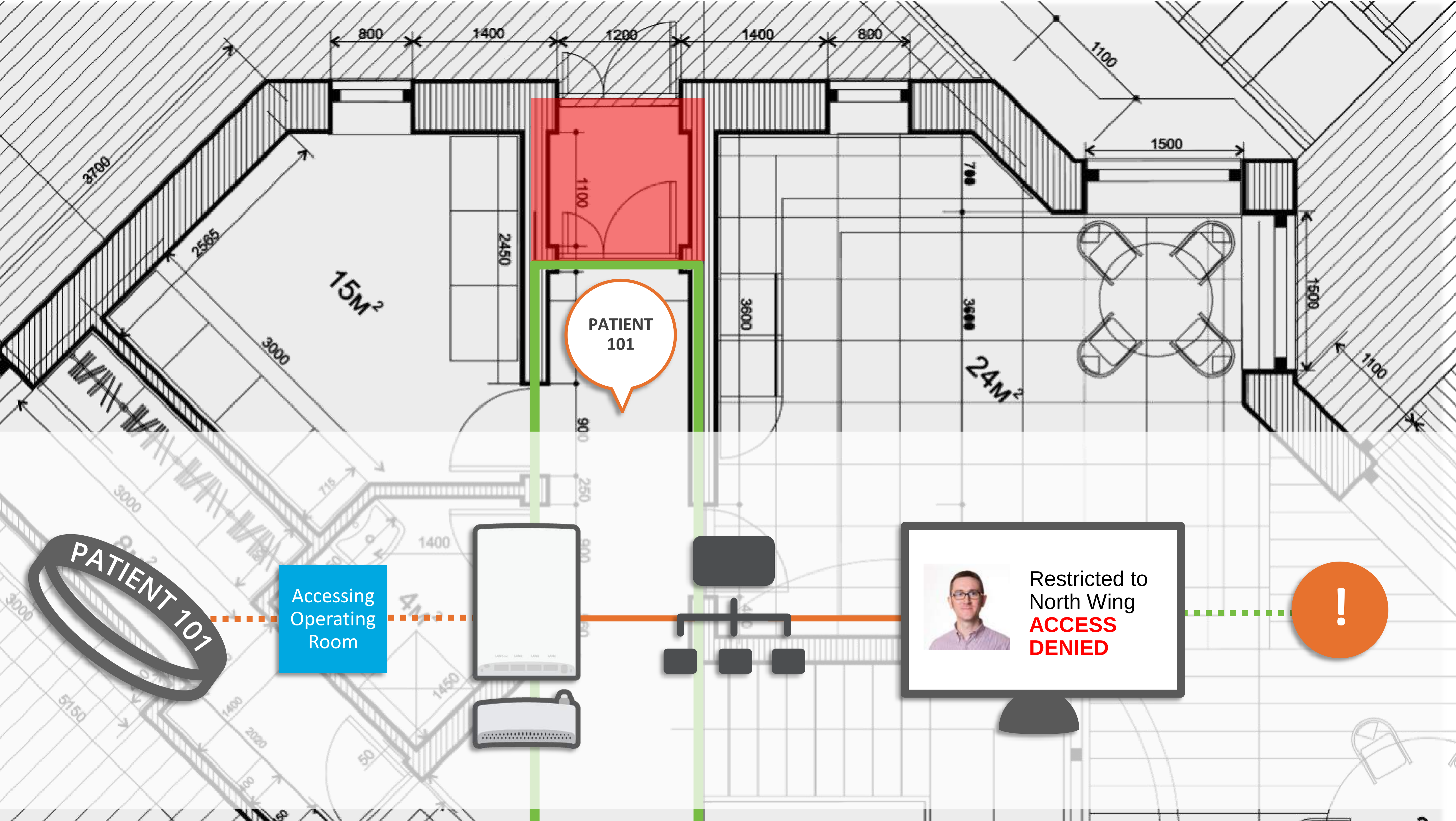


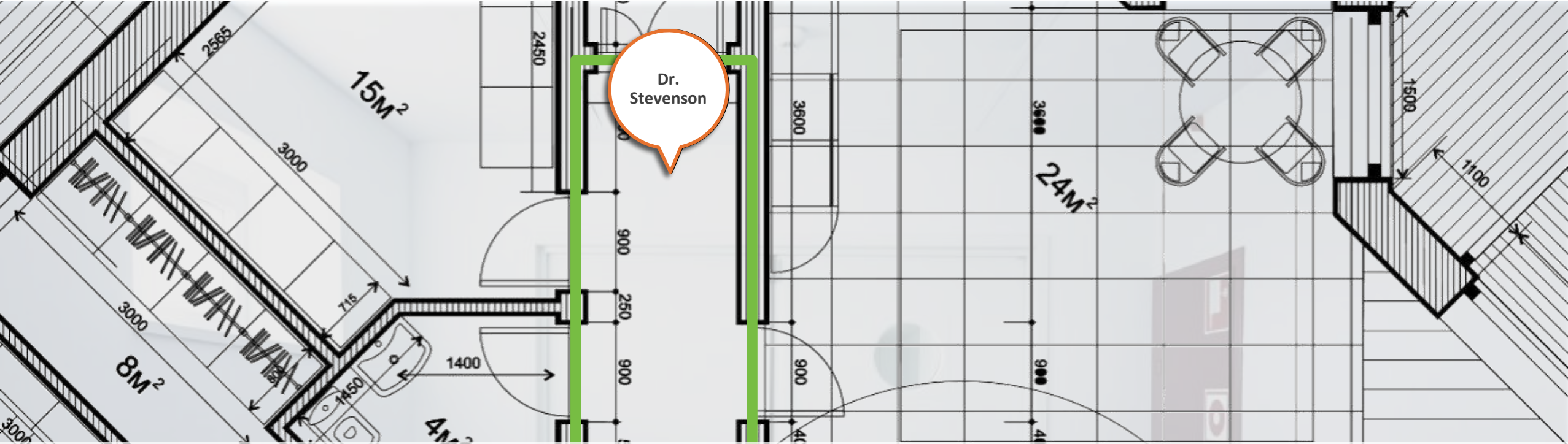
HEALTHCARE



Davide Badiali
Patient 101

Restricted to
North Wing


PATIENT 101
PATIENT 101
Accessing Operating Room
Restricted to North Wing
ACCESS DENIED
!



Dr. Stevenson
Employee# 284652

Panic

Security
Alert
Activated
Send

Location: O.R.

Robert Smith
Employee# 276852

Security Alert Activated:
Location: OR
Alerted by:
Dr. Stevenson

Mobile Connectivity

Copper/Fiber
Structured Cabling
supports WiFi and DAS

Connectivity for the licensed and unlicensed spectrum in buildings

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Communication Systems
Indoor cellular coverage and capacity

Compare the speed of the Gs below...if kbps were mph

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Communication Systems
Indoor cellular coverage and capacity

Existing Band Deployments (1900MHz)

5G New Bands (28GHz)

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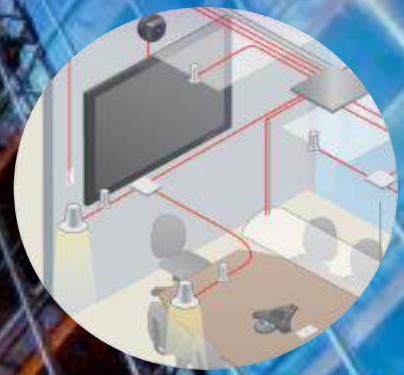
Connectivity Challenge

Intelligent Lighting and Sensors

WiFi and In-Building Wireless

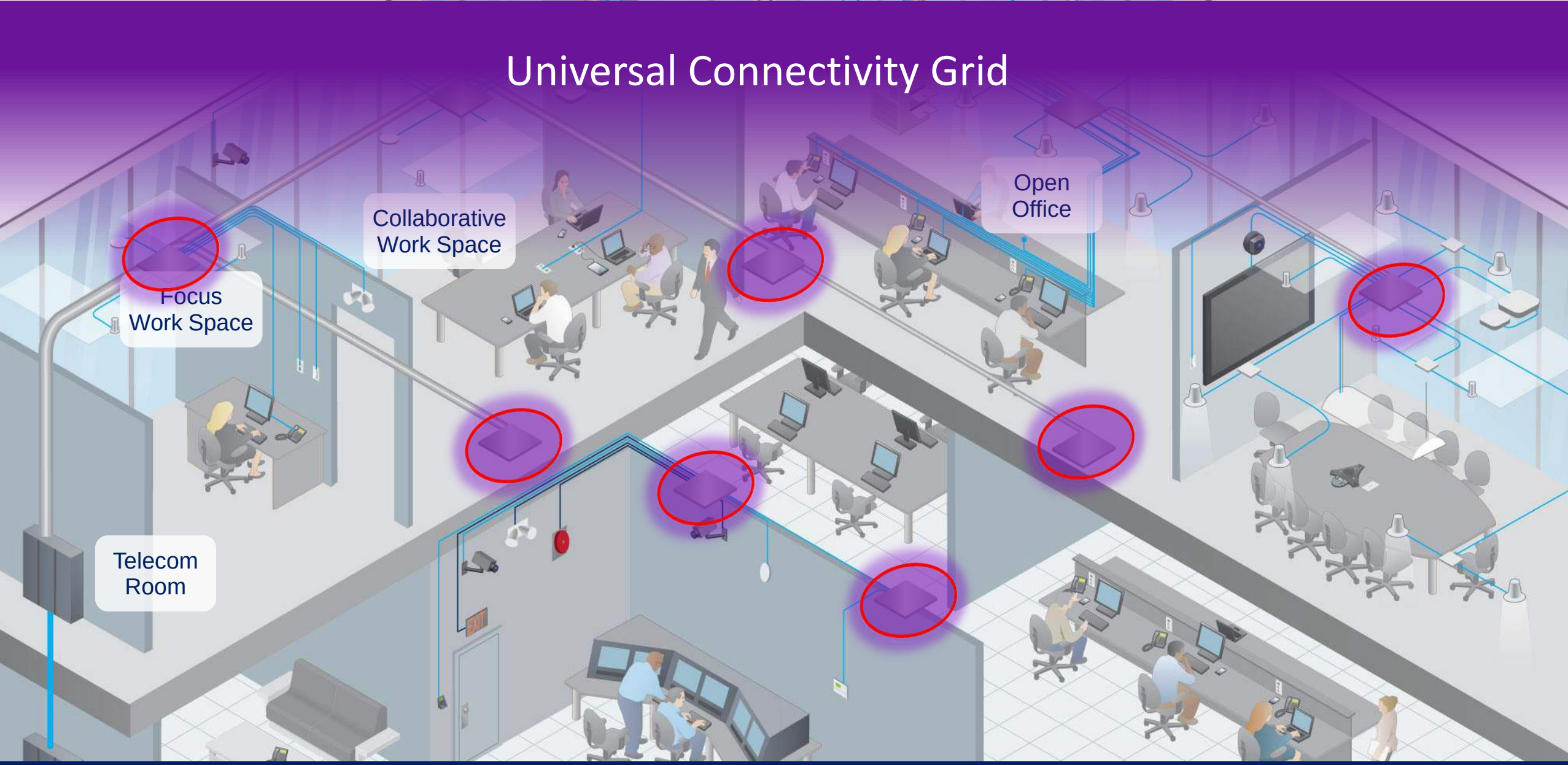


Audiovisual Services

Wired LAN

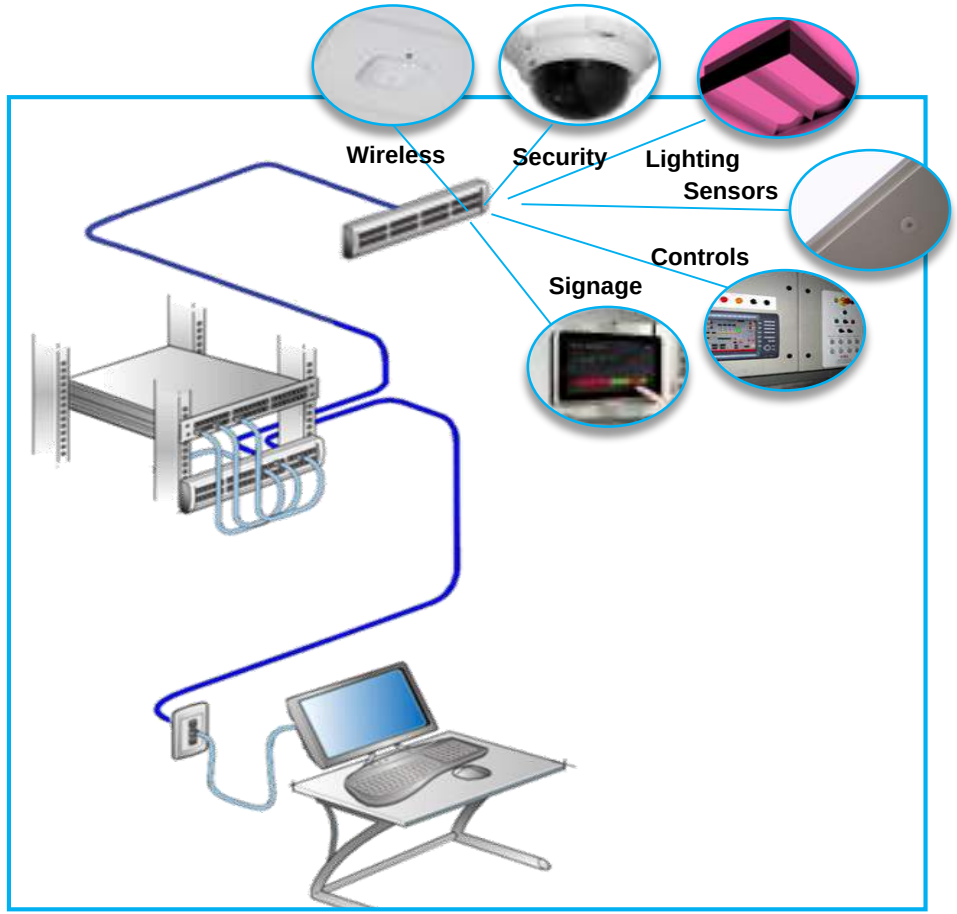
Building Automation and Access Control

Universal Connectivity Grid



A common connectivity platform provides efficiencies in design and operations

Planning for Integrated Low Voltage Infrastructure



Additional Planning Recommendations

- Security & Access Control
- Lighting and Sensors
- Building Controls
- Digital Signage
- Work Area Cabling

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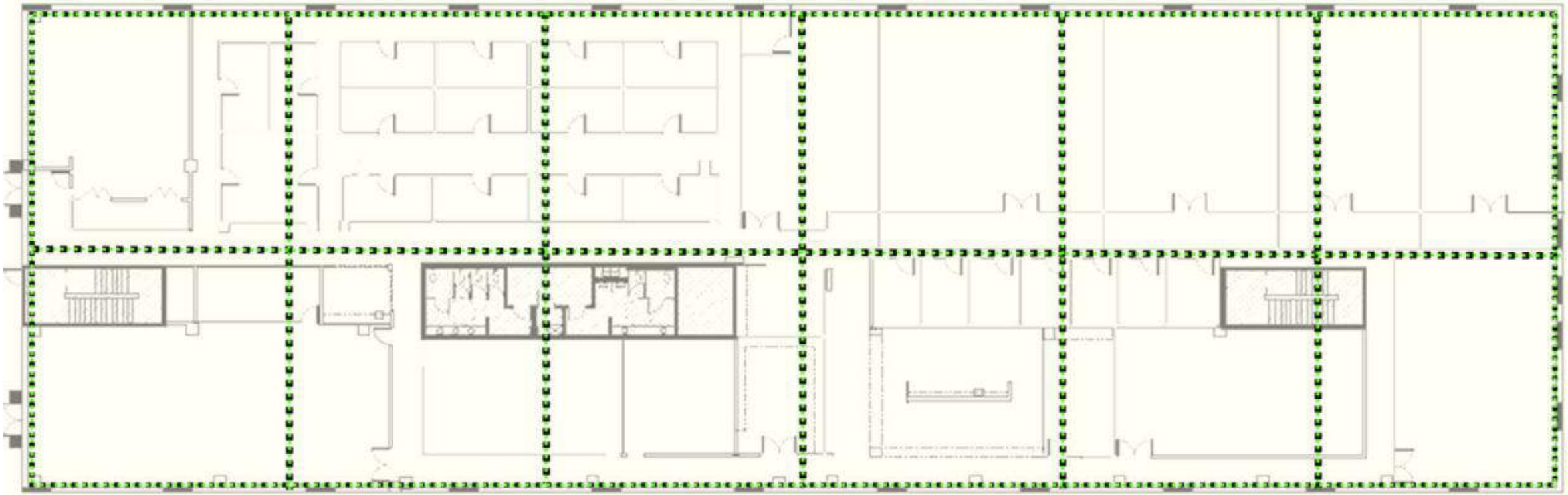
Universal Connectivity Grid



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Planning connectivity for UCG cells – ISO/IEC 11801-6

Table A.2 – Recom

Deployment	Office spaces[b]	In
Stand-alone	16 m^2 (4 m × 4 m grid)	16 (4
Overlay	16 m^2 (4 m × 4 m grid)	16 (4

Table A.3 – Estimated SOs per SCP

Service	Estimated SOs per SCP			
	Office spaces	Industrial spaces	Homes	Computer rooms
Access control	1	0,5	0,25	1
Burglar alarms	0,5	0,1	1	0,25
Asset management	0,25	0,25	0	0,25
Audio-visual	1	0,25	1	0,1
Building information	1	0,1	0,1	0,1
Building well-being	1	1	0	1
Energy management	1	1	1	1
Environmental control	1	1	1	2
Fixed IT services[a]	2	1	0	1
Personal well-being	0,5	0,5	0,5	0,5
Shared IT services	1	0,5	0,25	0,5

[a] Provision for fixed IT services not required in overlay implementation.

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UCG around 49m2 (7x7m), and minimun 4 x RJ45 Category 6A Outlets

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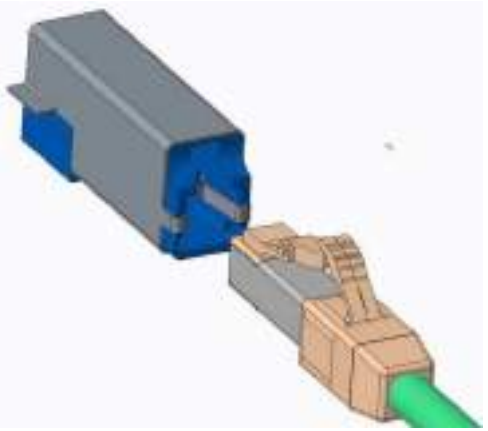
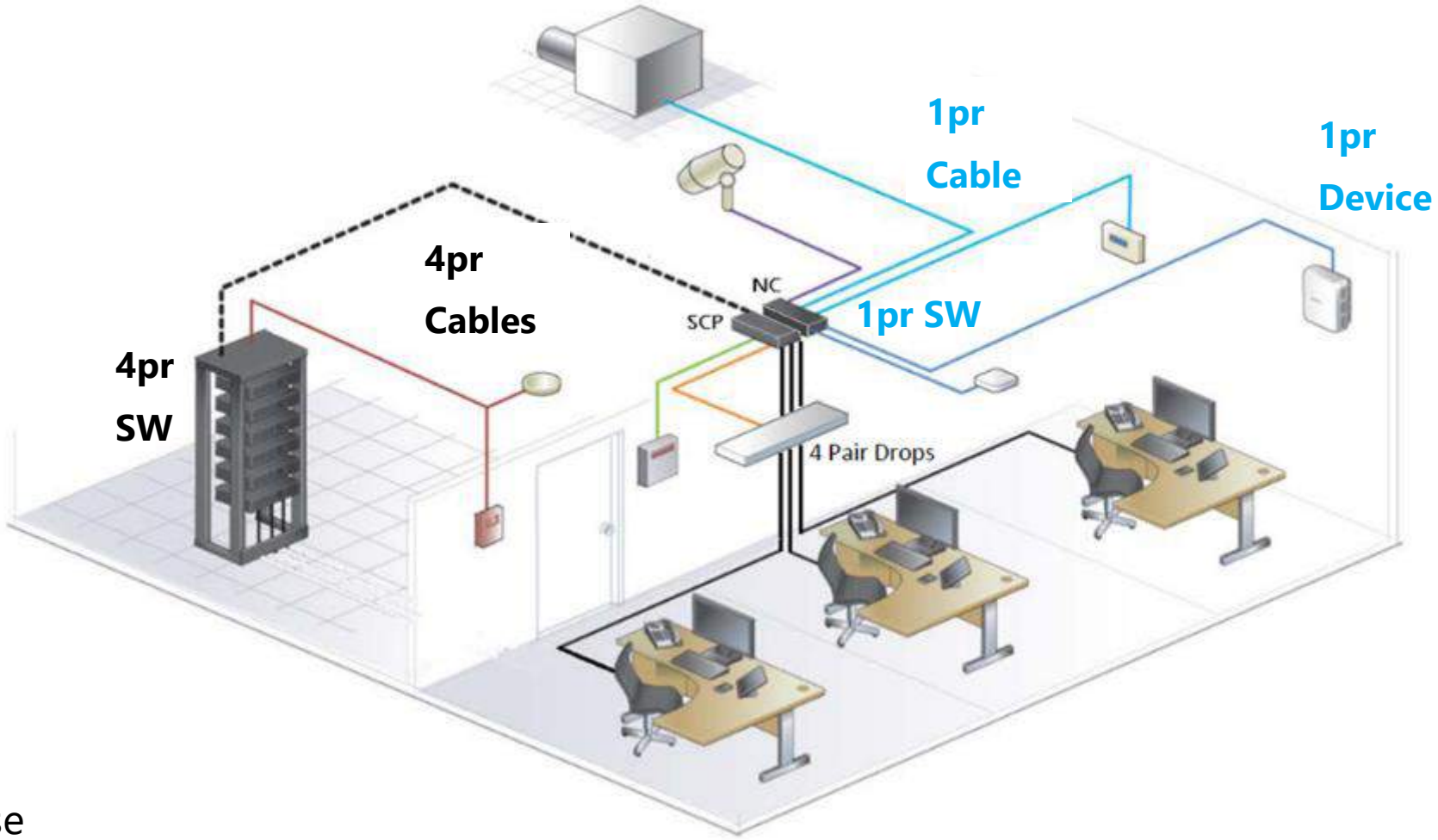
Single Pair Ethernet





IEEE 802.3cg 10Mb/s
Ethernet over a single balanced pair

- Power + Data
- 15m and 1000m
- Multidrop – 25m and 8 stations
- Cable & Cabling Topology Reuse
- Standarized connector (LC copper IEC 63171-1)

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Single Pair Cable Specifications – IEC

- As of April 12, 2018: Section 5.3 of IEC 61156-11 states that the conductor shall be a solid annealed copper conductor, in accordance with 5.2.1 of IEC 61156-1 and should have a nominal diameter between 0,4 mm and 0,65 mm. A conductor diameter of up to 0,8 mm may be used.
- In other words, the standard is targeted toward 22 to 26 AWG conductors but supports conductors as large as 20 AWG.
- No support for 18 AWG is implied.

AWG #	Diameter (mm)	Diameter (inch)
18	1.0237	0.0403
19	0.9116	0.0359
20	0.8118	0.032
21	0.7229	0.0285
22	0.6438	0.0253
23	0.5733	0.0226
24	0.5106	0.0201
25	0.4547	0.0179
26	0.4049	0.0159
27	0.3606	0.0142
28	0.3211	0.0126

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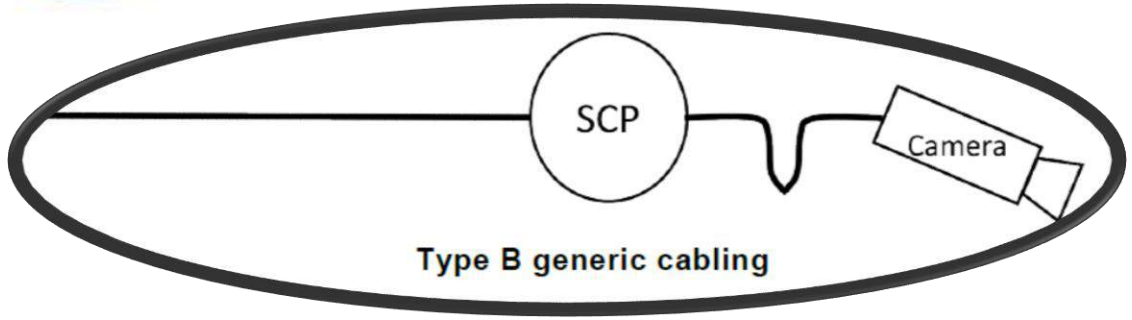
Ceiling Connector Assembly



- The CCA provides a method of termination of High Quality and at reasonable cost of wiring on RJ45 male connectors.
- Suitable for applicances like Wfi Aps, IoT, IP Cameras, BMS...

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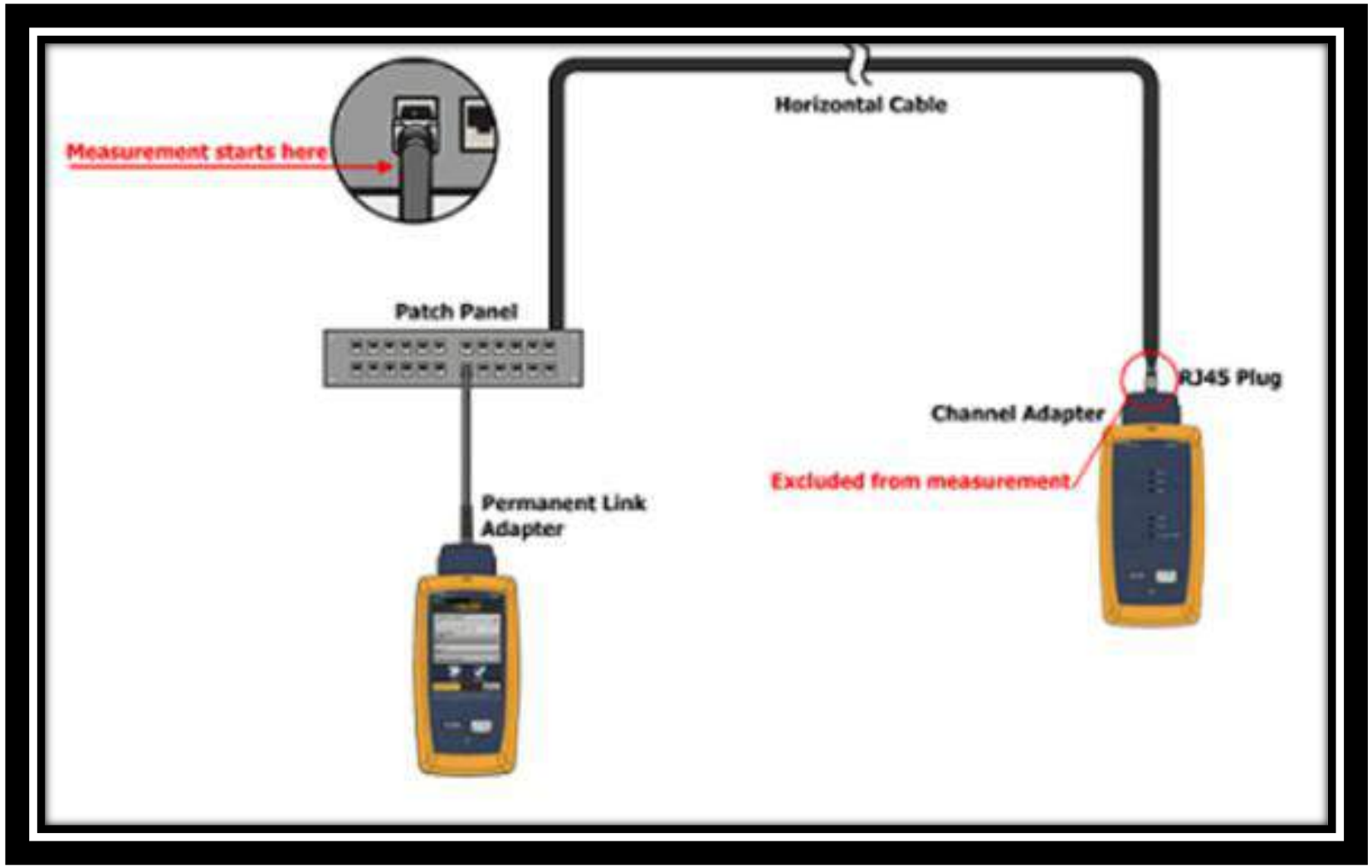
Testing of Ceiling Connector Assembly



Included in
ANSI-TIA 568.2-D

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Automated Infrastructure Management - ISO/IEC 18598

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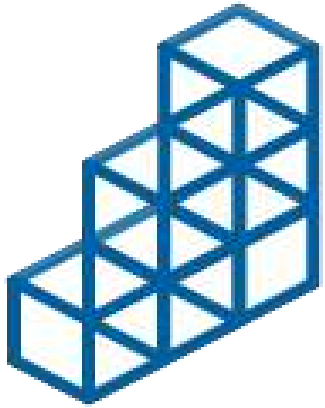
The Infrastructure of the Future

Simple
to use
Converg.



Scalable
to grow
Cat6A

Flexible
to change
UCG

Intelligent
to manage
AIM

Ubiquitous wired & wireless infrastructure

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