Utility Grade (UTG) INFRASTRUCTURE℠

Technical application guide

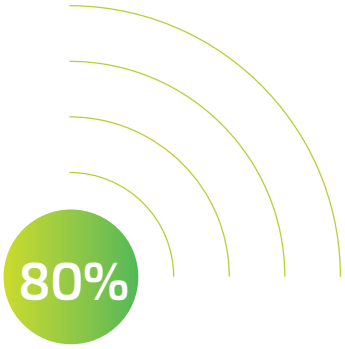
COMMSCOPE®

The need for utility grade

There's a revolution happening all around us. Building technology is rapidly evolving to meet productivity and efficiency demands of building owners, managers and tenants alike. Essential to keeping up with this rate of technology change is a future-ready infrastructure layer that supports seamless connectivity, building automation and control, as well as the convergence of information technology (IT) and operational technology (OT) applications across a common platform.

The question is...

HOW WILL YOUR BUILDING INFRASTRUCTURE EVOLVE?



of tenants experience connectivity issues at the office.

CONNECTIVITY ISSUES IMPACT

Employee
36%

Company
77%

% of Wired Score survey respondents claiming connectivity issues impact productivity and profitability. Connectivity issues at the office.

77%
of tenants would sign a longer lease in a building with superior connectivity infrastructure.

- Wired Score, The Value of Connectivity

This Application Guide will provide you with a better understanding of why utility grade infrastructure is required to facilitate digital transformation for today's leading organizations.

It will also detail unique aspects of the Utility Grade INFRASTRUCTURE℠ (UTG) program, including how it is superior to existing solutions, testing and performance attributes, UTG innovation partners and the UTG certified integrator program.

For more information on **Utility Grade Infrastructure**, please contact your local CommScope representative or visit commscope.com/UTG.

Enabling digital transformation

Estimates say the number of buildings worldwide is going to double by 2060[1], and combined with the number of connected devices growing to 75 billion in the next six years2, these spaces are transforming to keep up with our reliance on technology for business and personal use.

All of these devices require network connectivity, which helps facilitate convergence and digital transformation that allows organizations to operate with speed, agility and interoperability across multiple systems.

Building on the trend of convergence over the past few decades with voice and data and video surveillance migrating to a common network, we are now at an intersection where more building subsystems and endpoint devices will become network enabled.

This has the potential to put an enormous strain on the network, not to mention overwhelm an IT department's management of disparate building subsystems, especially given traditionally fragmented ways of operating. We have reached a tipping point where we must look for more cost-effective models that will support future applications and can be managed over a common building platform.

A reliable and resilient network allows an organization to meet their goals, whether that is attracting premium tenants and employees, simplifying the management of multiple building systems or enhancing collaboration and workforce productivity.

Building the 4th utility

With all of these competing demands, more and more we are seeing the adoption of a 4th utility approach to information.

Building owners and managers have gone from only supplying electricity, gas and water to workplaces, to planning for telecommunications infrastructure that can support advanced technology.

Cabling infrastructure can often be value engineered to reduce costs, but this approach won't support the evolution of building technology and provide the performance and reliability expected in a utility.

97%

of organizations are currently planning digital transformation initiatives.

- MuleSoft, 2019 Connectivity Benchmark Report

Understanding stakeholder goals

Critical to making the right selection for your building infrastructure is an understanding of key drivers of stakeholders within a facility.

Developers and building owners

- Address higher tenant expectations
- Attract long-term, premium tenants
- Provide superior connectivity infrastructure
- Extend building system life cycle

End users and tenants

- Provide seamless connectivity for visitors and staff
- Attract and retain talent
- Enhance workforce productivity and space utilization
- Access real-time data for automation and control
- Protect against cyber threats

Architects, consultants and engineers

- Design for accelerated rate of technology change
- Offer future-ready solutions for industry- leading companies
- Provide definitive, beyond-standards tested solutions
- Simplify specification and design process

Installers and integrators

- Install, test and certify future-ready solutions
- Meet accelerated construction schedules
- Reduce unproductive labor at jobsite
- Simplify convergence of systems
- Solution proficiency from design to install

Utility Grade INFRASTRUCTURE℠

is a new technology platform, assurance program and design approach that redefines the infrastructure layer to support building subsystems, technologies and applications.

Developed alongside leading manufacturers, and third-party tested and verified by UL, the UTG program offers UTG-rated cabling solutions built to support your building's specific application, performance and life cycle needs.

UTG TECHNOLOGY STACK

ENDPOINT | CYBER SECURITY

AMENITY SYSTEMS
PARKING SYSTEMS
ASSET TRACKING
ELEVATORS
LIGHTING
HVAC
RESERVATION SYSTEM
AUDIO TECHNOLOGY
DIGITAL SIGNAGE
INTRUSION DETECTION
ACCESS CONTROL
VIDEO SURVEILLANCE
WIRELESS
DATA
VOICE

CONVERGED BUILDING APPLICATIONS

POE | POWER DELIVERY
COPPER | FIBER | WIRELESS

UTG technology stack

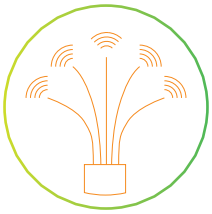
As part of the Utility Grade INFRASTRUCTURE Platform, the UTG Technology Stack identifies the foundational elements of a common building platform that support the convergence of various IT and OT building subsystems.

Every network-enabled device requires connectivity, power and security. UTG provides a specable, interoperable and future-ready solution, addressing these elements across all building systems.

Foundational elements of UTG include:

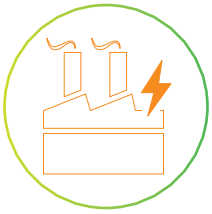
Utility-ready structured cabling

Core to the UTG program is offering new UTG-rated cabling solutions from world-class manufacturers.



Advanced power delivery

UTG will address advanced power delivery through definitive testing of UTG-rated cabling solutions. These UL-verified solutions will include design recommendations and increased bundling sizes to support more PoE applications.



Enhanced cyber security

As more devices come onto the network, the potential for cyber threats needs to be accounted for. Future phases of the UTG program will offer best practices and solutions that provide enhanced cyber protection for converged building applications.

Phases of UTG

Phase I of the Utility Grade INFRASTRUCTURE program will launch with UTG-rated cabling solutions, while Phase II will add technologies that support applications in the UTG Technology Stack.

UTG framework and ratings

The UTG program includes a framework that defines the Technology Layer, Test Specification and UTG Levels Ratings. The next few pages of this guide dive deeper into testing and relevant application tables, but it's important to understand how UTG Ratings work.

As part of a common platform, every technology family or layer will have a unique identifier, such as:

UTG[C4P] **stands for:**

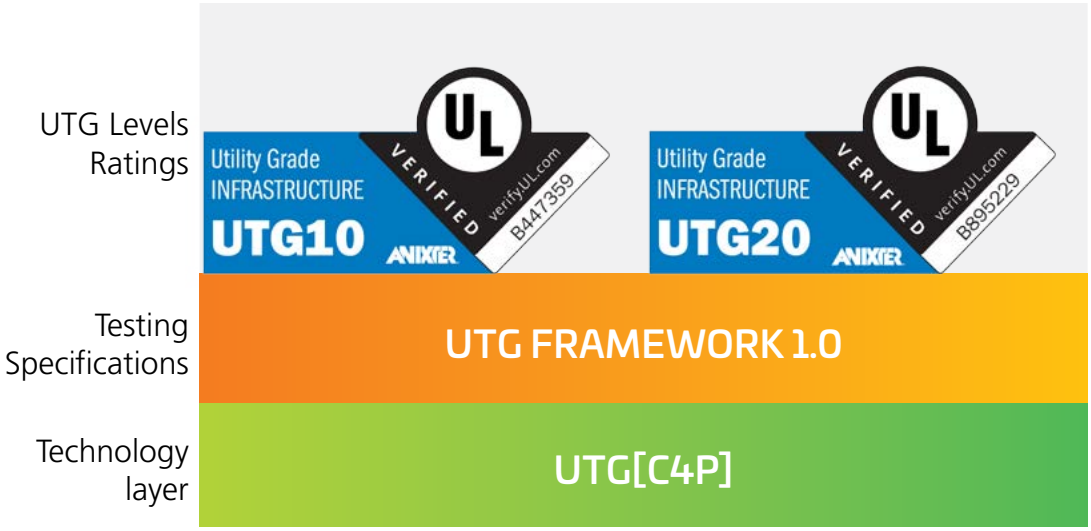
- UTG: Utility Grade INFRASTRUCTURE
- C: Copper
- 4p: 4 pair

The first release will start with a 4-pair copper solution, made up of a full UTG-rated Channel, including cable, patch panels, connectivity and patch cords. This will be independently tested to a beyond-standards specification by UL, which forms the basis of the UTG Framework 1.0.

Each technology as part of Utility Grade INFRASTRUCTURE will offer a potential of three UTG-rated solutions depending on your specific application, performance and life cycle needs.

- UTG10
- UTG20
- UTG30 (future)

Be sure to review the application and attribute table for more on the capabilities of each UTG-rated solution.



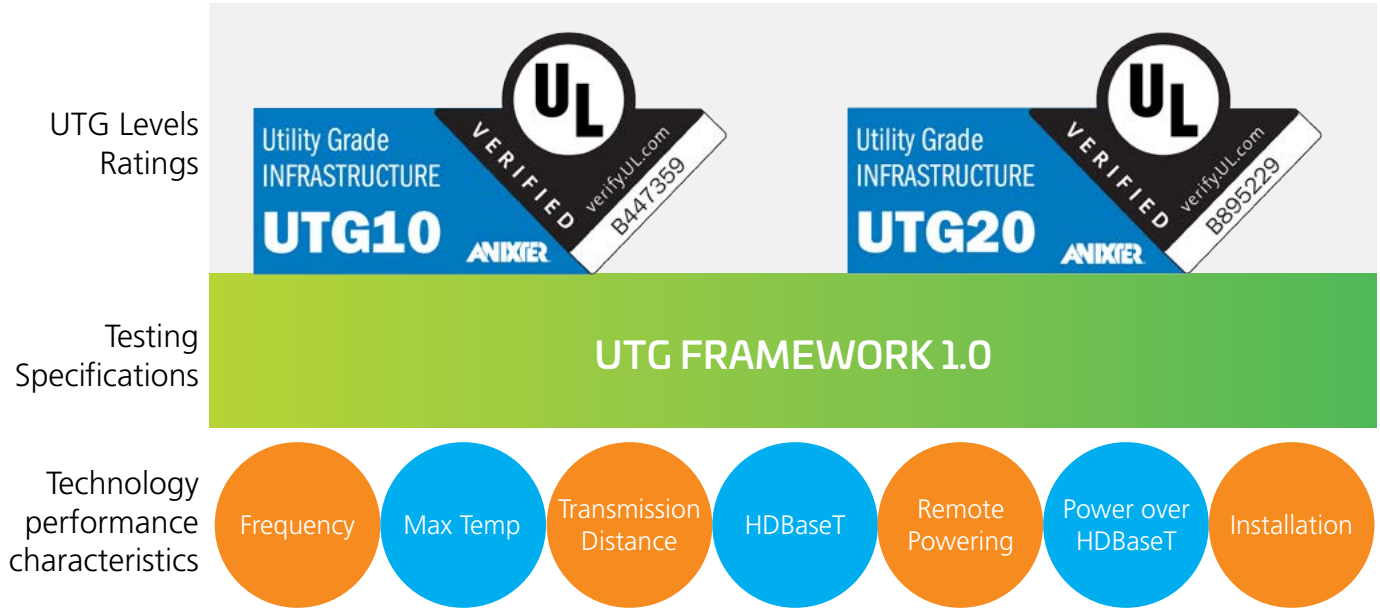
UTG framework and testing

The UTG Test Framework has been developed by industry experts to characterize the attributes and construction for a future-ready, utility grade solution that will provide short-term and long-term benefits. UTG has been designed as the common infrastructure for the built environment by utilizing real-life definitive application testing as well as industry first, UTG-exclusive testing protocols.

UTG ratings include a number of performance characteristics, such as:

- Higher frequency measurement
- Elevated maximum temperature, including jacket and operating temperature
- Extended transmission distances
- Full channel HDBaseT and Power over HDBaseT (PoH)
- Superior cable bundle performance under load (remote powering)
- HD and 4K UHD video
- Flexibility for installation

Each UTG rating will provide verified applications assurance and simplifies the specification and design process as a common building platform.



The UTG difference

Although UTG cabling is 4-pair unshielded twisted pair and meets and exceeds all category standards, CommScope has developed cabling to meet the higher test specification of the UTG framework.

Based on the UTG Framework performance characteristics on the previous page, this comparison chart summarizes how the UTG10 and UTG20 solutions exceed the performance of standard category cabling.

ATTRIBUTES AND APPLICATIONS	UTG10	UTG20
STANDARDS AND VERIFICATION		
Industry standards	Exceeds ANSI/TIA + UL Verified	Exceeds ANSI/TIA + UL Verified
TRANSMISSION DISTANCE		
Maximum horizontal distance @ 10Mbps	185 meters	185 meters
Maximum horizontal distance @ 100Mbps	150 meters	150 meters
Maximum horizontal distance @ 1Gbps	100 meters	100 meters
Maximum horizontal distance @ 10Gbps	37 meters	100 meters
BANDWIDTH + SPEED		
Maximum data transmission speed	10Gbps @ 37 meters	10Gbps @ 100 meters
Maximum bandwidth	425 MHz	500 MHz
APPLICATIONS		
Video Surveillance		
1080p HD	150 meters	150 meters
4K UHD	150 meters	150 meters
PoE		
Type I - 15.4W	150m @ 10BASE-T 150m @ 100BASE-T 100m @ 1000BASE-T 37m @ 10G BASE-T	185m @ 10BASE-T 150m @ 100BASE-T 110m @ 1000BASE-T 100m @ 10GBASE-T
Type II - 30W	150m @ 10BASE-T 150m @ 100BASE-T 100m @ 1000BASE-T 37m @ 10GBASE-T	150m @ 10BASE-T 150m @ 100BASE-T 110m @ 1000BASE-T 100m @ 10GBASE-T
Type III - 60W	100m @ 10BASE-T 100m @ 100BASE-T 100m @ 1000BASE-T 37m @ 10GBASE-T	150m @ 10BASE-T 150m @ 100BASE-T 110m @ 1000BASE-T 100m @ 10GBASE-T
Type IV - 100W	100m @ 10BASE-T 100m @ 100BASE-T 100m @ 1000BASE-T 37m @ 10GBASE-T	120m @ 10BASE-T 120m @ 100BASE-T 110m @ 1000BASE-T 100m @ 10GBASE-T
Max Bundle Size	72 cables	90 cables
HDBaseT		
1080p HD	100 meters	100 meters
4K UHD	100 meters	100 meters
PoH	100 meters	100 meters
MECHANICAL		
Installation flexibility	Flex Force Level 1, 2, 3	Flex Force Level 1, 2, 3

Application and attribute tables

UTG solutions are developed and tested to eliminate guesswork out of media selection. This will allow you to utilize a 4th utility approach, providing greater performance and reliability beyond industry standards, while also extending your infrastructure to better align with building system life cycles.

Beyond standards | UL verified

STANDARDS AND VERIFICATION		
	UTG10	UTG20
Industry standards	Exceeds ANSI/TIA + UL Verified	Exceeds ANSI/TIA + UL Verified
Test method	UTG Bear Attack (BERetAC)	UTG Bear Attack (BERetAC)

Beginning with baseline TIA infrastructure standards, UTG exceeds these attributes through definitive UL testing. Anixter and UL developed an industry-first UTG Bear Attack (BERetAC) Test Method℠, which combines bit error rate(BER), elevated temperature(et) and alien crosstalk (AC), while simultaneously delivering data, video and power over an unshielded twisted-pair (UTP) cabling system.

The UTG Bear Attack Test Method is particularly important to ensure optimal support of high performance applications, typically addressed with UTG20 rated solutions.

Supports extended transmission distances

TRANSMISSION DISTANCE		
	UTG10	UTG20
Maximum horizontal distance @ 10Mbps	185m	185m
Maximum horizontal distance @ 100Mbps	150m	150m
Maximum horizontal distance @ 1Gbps	100m	100m
Maximum horizontal distance @ 10Gbps	37m	100m

With increased convergence of IT and OT applications, it is essential to support low and high bit rate edge devices at greater distances. UTG10 and UTG20 can support low bit rate devices like OT and physical security applications at up to 150m, while also supporting increased distances for high bit rate IP-based applications.

The ability to greatly increase transmission distances can also lead to a reduction in the number of telecommunications rooms required, resulting in potential savings on square footage requirements and construction costs.

Delivers higher bandwidth capabilities

BANDWIDTH AND SPEED		
	UTG10	UTG20
Maximum data transmission speed	10Gbps @ 37m	10Gbps @ 100m
Maximum bandwidth	425 MHz	500 MHz

UTG10 and UTG20 cables have not only been swept for bandwidth, but we also extended the limit lines during testing to ensure operation at these parameters. This provides more headroom margin for connectivity performance and consistency.

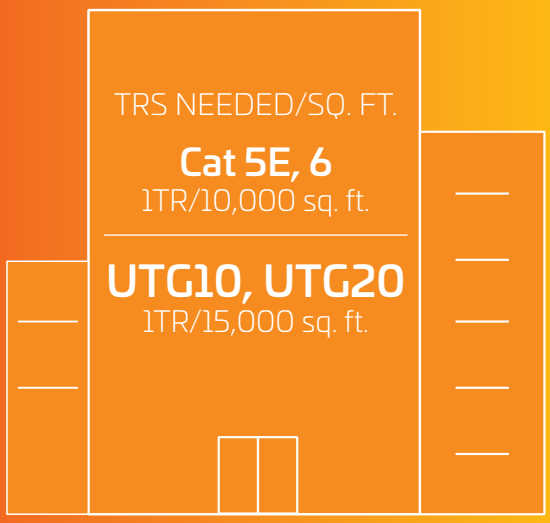
Optimizing operational technology performance

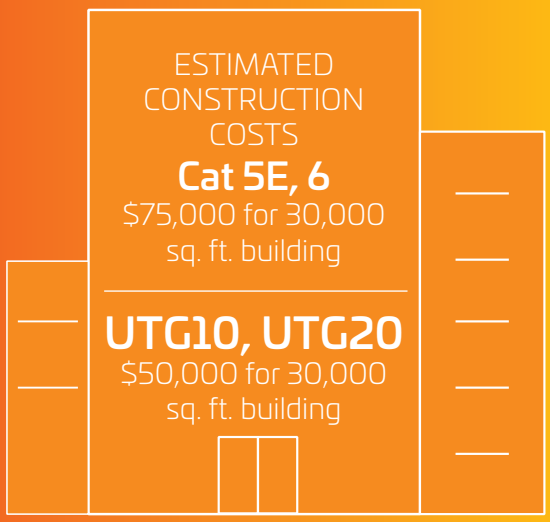
SQUARE FOOTAGE AND CONSTRUCTION COST SAVINGS

Real Estate and Telecommunications Rooms (TR)

Ethernet standards typically limit transmission distance to 100m, creating challenges with IoT sensors and other applications distributed across a building. UTG-rated cabling solutions support extended transmission distances with OT applications, creating an opportunity to reduce the number of TRs required.

Based on industry averages, this could mean tremendous savings on square footage and construction costs.



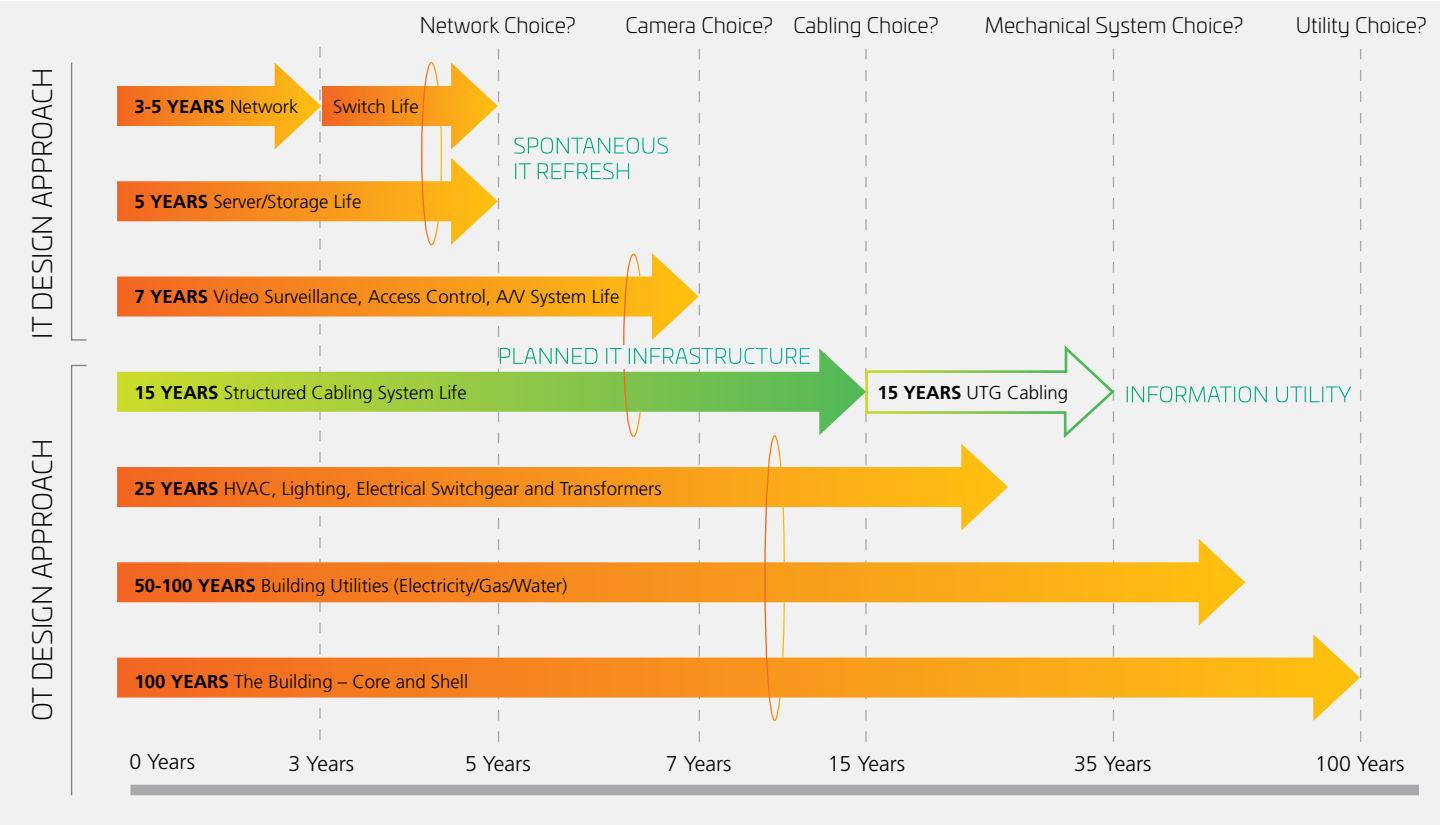


APPROXIMATELY
$25,000 SAVINGS
per 30,000 sq. ft. building

Extending technology refreshes

Another key component of generating cost savings and return on investment is better alignment of your infrastructure with the built environment. The various systems that make up a modern building have very contrasting life spans and are specified and designed by different stakeholders.

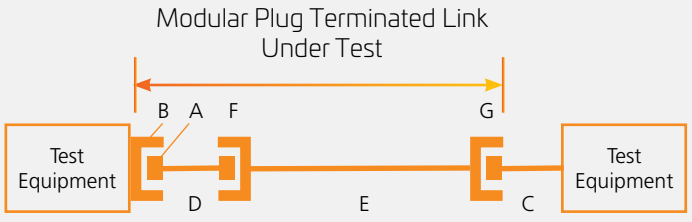
As the chart below outlines, UTG offers a high-performance structured cabling system that accounts for both information technology and operational technology applications, while supporting business resiliency and multiple technology refreshes.



MPTL - Above-Ceiling Design Considerations

UTG supports the recent TIA-568.2-D standard for a modular plug terminated link (MPTL), making the transition much easier when connecting various ceiling-based technologies , such as intelligent lighting, surveillance cameras, access points and sensors.

The horizontal connection point or consolidation point along with field terminatable modular plugs provides a practical way of connecting more end points and devices. Utility Grade INFRASTRUCTURE leverages longer distance capabilities, offering savings in total cost of material, installation and ownership.



Legend

A: Modular plug link termination
B: Patch cord test head
C: Test equipment cord
D: Optional consolidation point cabling
E: Horizontal cable
F: Optional consolidation point
G: Horizontal cross-connect or interconnect

Maximum Length
D + E = 90 m

Source: TIA-568.2-D

Technology applications

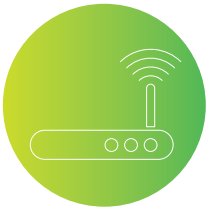
Supports higher FPS and lower compression

VIDEO SURVEILLANCE		
	UTG10	UTG20
1080p HD	100m	100m
4K UHD	100m	100m

In addition to supporting higher frames per second, UTG extends distance and power for camera applications, simplifying installation methods utilizing direct device connection with a modular plug terminated link (MPTL).

Increases distances and bundling sizes to support more PoE applications

REMOTE POWERING (PoE)		
	UTG10	UTG20
Type I - 15.4W	Up to at least 150m	Up to at least 150m
Type II - 30W	Up to at least 150m	Up to at least 150m
Type III - 60W	Up to at least 100m	Up to at least 100m
Type IV - 100W	Up to at least 100m	Up to at least 100m
Max Bundle Size (0.5 Amps) @ 45C ambient	72 cables	90 cables



PoE represents the ability to remotely power and manage intelligent devices, while reducing traditional electrical infrastructure cost and plug loads. UTG10 and UTG20 cables eliminate degradation of insertion loss and maintains performance at longer distances with edge devices, while still meeting code compliance.

Supports 4K streaming at extended distances

HDBaseT AND 10Gbps SDVoE		
	UTG10	UTG20
1080p HD	100m	100m
4K UHD	100m	100m
PoH	100m	100m

Superior connectivity is necessary to support the rapid evolution of video technology. Within the industry, there are limitations with electronics and cabling meeting HDBaseT requirements, but UTG solutions are verified to deliver 4K streaming at a full 100m application distance, in addition to power and video over the same cable via PoH.

Supports next-generation Wi-Fi technology

WIRELESS		
	UTG10	UTG20
WI-FI (IEEE 802.11ac)	10Gbps @ 37-50m	10Gbps @ 100m
WI-FI (IEEE 802.11ax)	10Gbps @ 37-50m	10Gbps @ 100m

UTG20 is optimized for next-generation Wi-Fi, verified to deliver 10Gbps @ 100m with extended headroom. This is the preferred choice for seamless connectivity throughout a building supporting multiple wireless streams.

Provides ease of installation for integrators

MECHANICAL		
	UTG10	UTG20
Installation flexibility	Flex Force Level 1,2,3	Flex Force Level 1,2,3

As part of the UTG framework, UL developed industry-first test parameters around installation readiness. This is to ensure a UTG-rated solution will be craft friendly for installation, flexibility and consistency.

Each UTG-rated cable will include a Flex Force rating based on a range of ounce-feet, highlighting the ease of handling for pulling, installing and terminating.

Flex Force Testing	UTG FLEX FORCE TABLE		
Flex Force Rating	FLEX FORCE 3 46-60 oz-ft	FLEX FORCE 2 31-45 oz-ft	FLEX FORCE 1 16-30 oz-ft
Craft Friendliness	GOOD	BETTER	BEST

Simplifying specifications and design

Value of UTG for architects, consultants and engineers

Essential to meeting the demands of aggressive timelines and construction schedules is the simplification of the specification and design process without compromising on quality.

This simplification also provides a place for network infrastructure to be part of the early design phase of a project, where it can be considered as a utility alongside electricity, gas and water.

As part of the UTG program, Anixter has developed thorough specification verbiage for both UTG10 and UTG20 solutions. In addition to key product details, the boilerplate specification includes guidance on:

- Supply chain solutions
- Certified integrators
- Application assurance warranty

This will aid in presenting a solution to meet all of the challenges of the developer, and eliminates concerns around LP compliance and the need for niche cables.

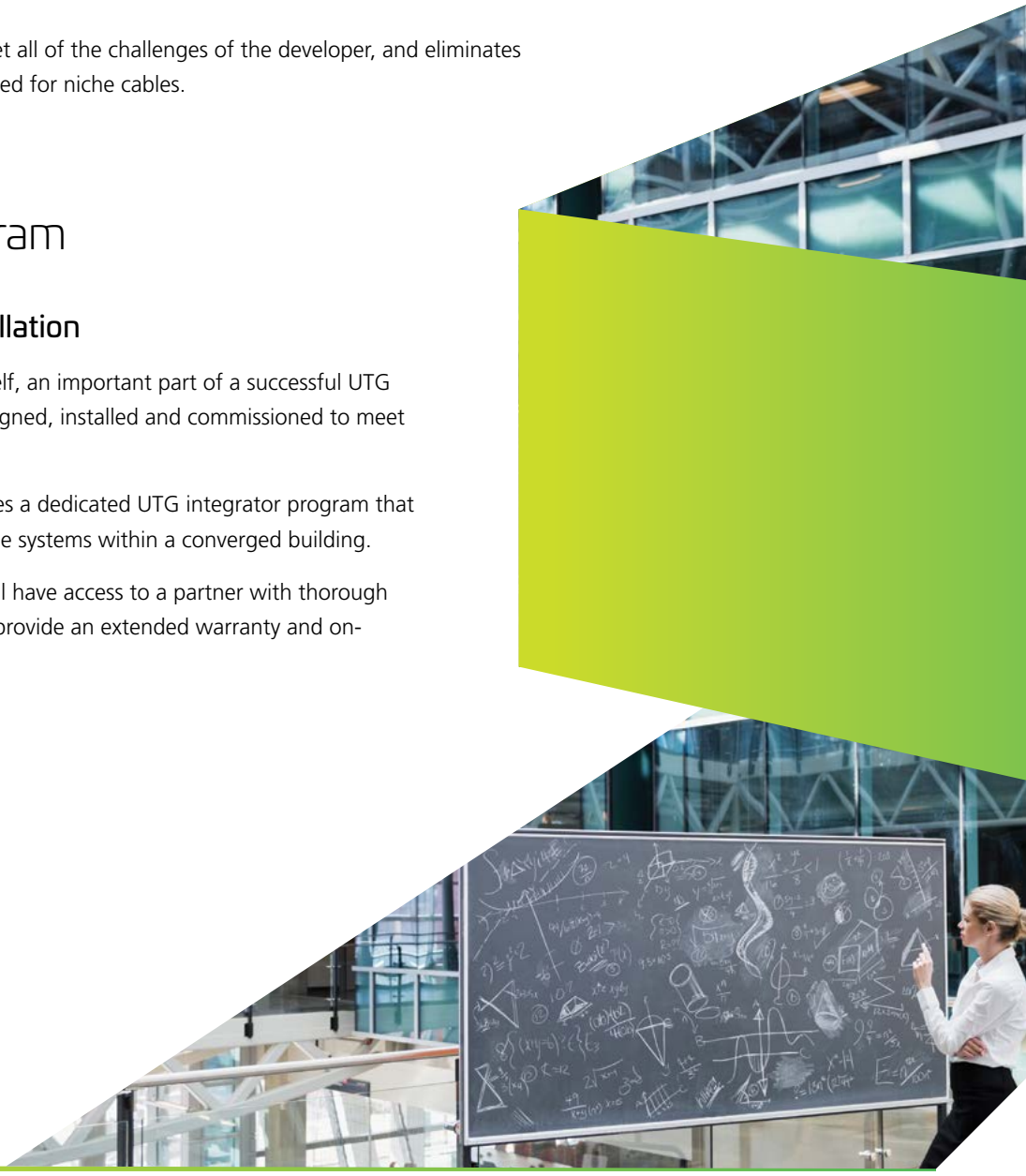
UTG certification program

Value of UTG for certified installation

Beyond the performance of the cabling itself, an important part of a successful UTG deployment is how well the solution is designed, installed and commissioned to meet the specific needs of the project.

Utility Grade INFRASTRUCTURE also includes a dedicated UTG integrator program that can support certified installation of all of the systems within a converged building.

By utilizing a UTG-certified installer, you will have access to a partner with thorough training on the solution with the ability to provide an extended warranty and on-demand support.



Field test and measurement

UTG-certified installers will have the ability to field test and certify to the UTG Framework. This will verify you are achieving optimal performance with the solution.

UTG-specific test parameters have been developed by field test and measurement manufacturers and will be available industry-wide alongside UTG cabling deployments.

UTG applications assurance warranty

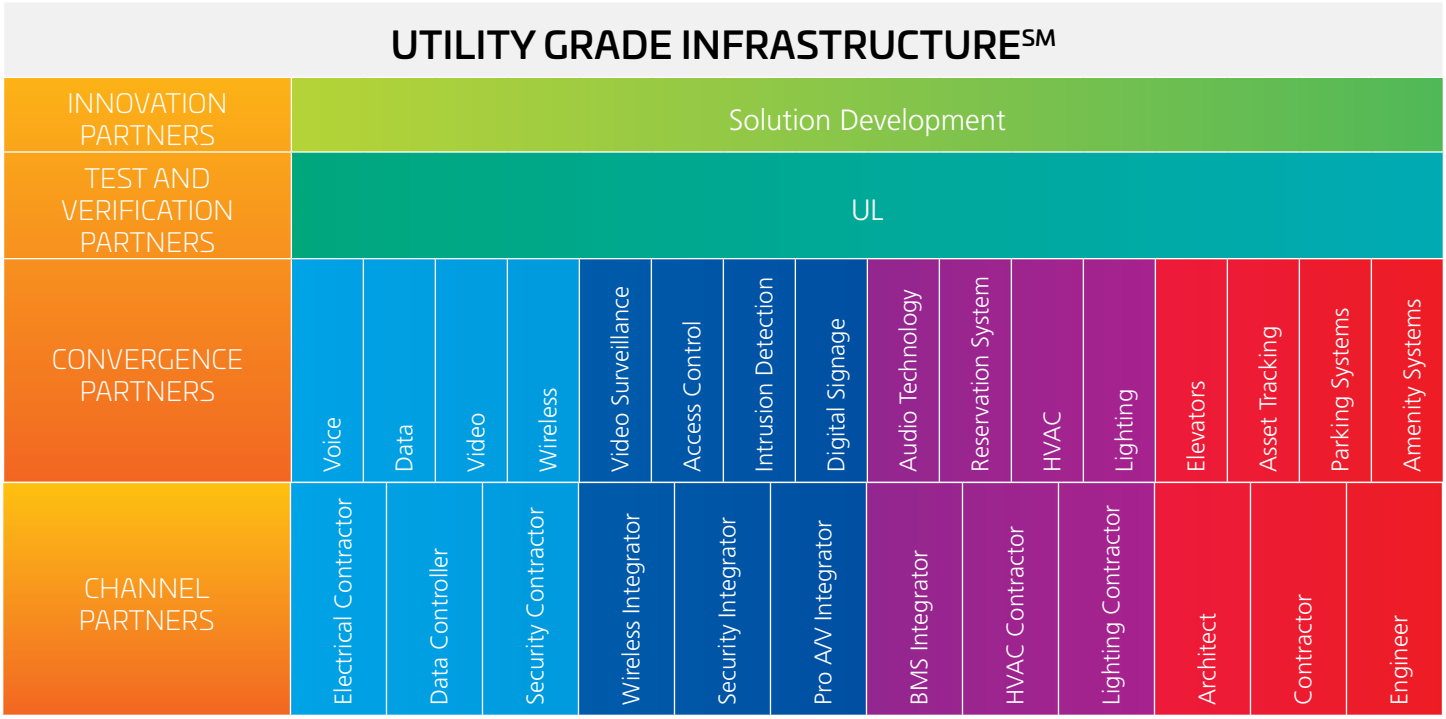
UTG-rated solutions offer an extended applications assurance warranty based on the performance test results verified by UL referenced in this document.

Provided by CommScope, this will offer the design capabilities and guarantees you need to migrate your infrastructure with confidence.

Important: The extended applications assurance warranty is only available when utilizing UTG-certified integrators.

UTG Ecosystem

Utility Grade INFRASTRUCTURE is dependent on an ecosystem of partners who offer product, testing and industry validation.



Members of the UTG Ecosystem include:

- **Independent test and verification**
  Performed by UL
- **Convergence partners**
  Manufacturers of interoperable building technologies that will be part of Phase II of the program
- **Channel partners**
  Architects, consultants and engineers, as well as a specialized group of UTG-certified installers

In total, this ecosystem has the ability to change the way organizations approach building the 4th utility.

Innovation partners

UTG has been co-developed alongside, CommScope, a world-class global partner. They have defined and manufactured critical UTG components necessary to form a best- in-class Utility Grade INFRASTRUCTURE, as well as provide key testing and validation of the solution.

More information on each innovation partner is available at commscope.com.

CommScope pushes the boundaries of communications technology with game-changing ideas and groundbreaking discoveries that spark profound human achievement. We collaborate with our customers and partners to design, create and build the world's most advanced networks. It's our passion and commitment to identify the next opportunity and realize a better tomorrow. Discover more at commscope.com.

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CO-113762.1-EN (07/21)