

Extended Distance Guide

End-to-End cabling systems from design to testing

ATLAS-X1™ SST

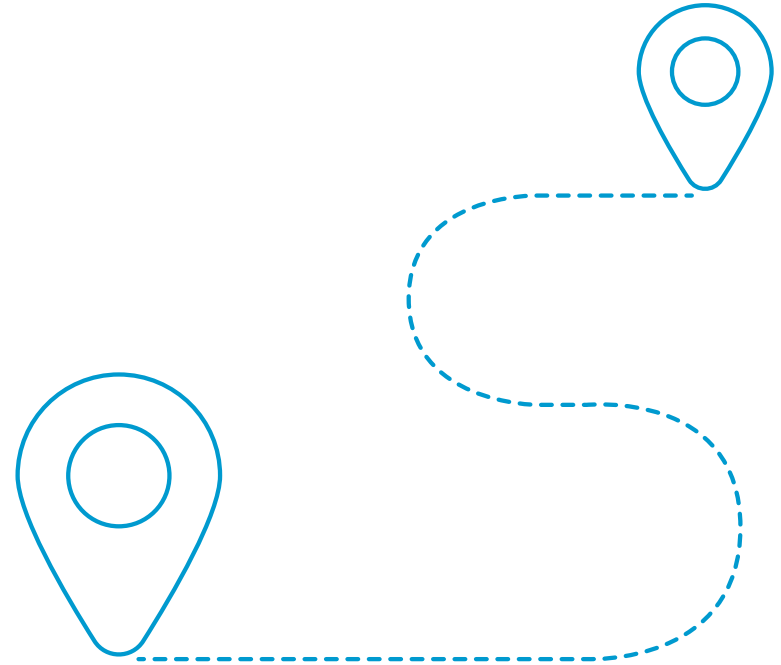


Contents

Introduction to Extended Distances

The ISO/IEC and TIA standards bodies have long established common design principles for copper structured cabling systems. One of the core principles is that the maximum horizontal cabling channel can be no longer than 100 meters. Defining the maximum channel length has enabled active equipment manufacturers to design transmission equipment based on a known worst-case performance scenario. This in turn ensures predictable electrical performance of transmission media, allowing interoperability and interchangeability of standards compliant components within the channel.

Organizations are increasingly deploying IoT devices such as occupancy sensors, smart thermostats, and air quality monitors, often located over 100 meters from the telecommunications room (TR). Additionally, IP security cameras and Wi-Fi access points are frequently installed in distant outdoor areas without AC power. The expansion and standardization of these IoT systems, with their unique power and data requirements, are pushing the limits of typical copper structured cabling systems. Overextending cable reach can result in high error rates and poor performance, while building additional TRs is often impractical due to time, effort, and cost. Therefore, organizations are seeking ways to extend cabling systems beyond 100 meters without compromising performance and quality.

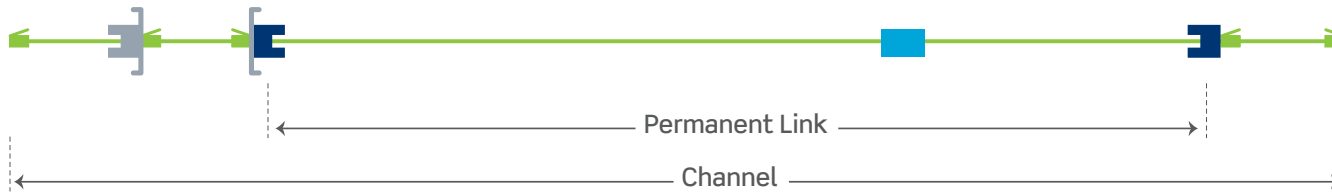


Cabling Standards

- ANSI/TIA 568.1
- ISO/IEC 11801
- EN 50173-1

TIA and ISO structured cabling standards specify a 90 m maximum Permanent Link (PL) and 100 m maximum channel length with up to 4-connectors including patch cords, up to a total of 10 m. Channels going beyond these limits are what we refer to as extended distance channels. When installing channels of 100 m or less, the installation practices outlined in ANSI/ TIA-568.2, ANSI/TIA-569, or ISO 11801, and the BICSI TDMM Manual must be followed.

4-Connector Channel



Common Applications

There are a few scenarios where the 100 m limitation can become problematic and/or become expensive to comply with. In these scenarios, it is desirable to implement stable, high-performance channels that extend beyond the 100 m limit.

Such scenarios include:



Outdoor or campus locations



Large spaces

- Warehouses
- Distribution Centers
- Sports Facilities



Industrial facilities



"That one..."

- Camera
- Access Control Station
- Wireless Access Point



Operational Technology / Intelligent Building Controls

Successful extension of channels beyond 100 m is achievable with the right structured cabling products and thoughtful implementation.

Key Considerations

When going beyond the 100 m standard, key points to consider include:

- Make certain the products specified have been thoroughly tested by the manufacturer and are backed by a warranty to achieve the expected performance.
- Ensuring that the specified extended distances apply for all of your required channel topologies, not just plug to plug.
- Ensuring that the extended distance performance that you require is specified over a real-world operating temperature range and not just at room temperature.
- Can your extended distance system meet category rated industry standards for 100 m channels as well as support extended distance applications in real world environments. One system for different applications.

The Leviton ATLAS-X1™ SST CAT 6A UTP MILLENNIUM™ system has been designed to assure the highest level of performance and reliability in these extended distance scenarios.



Real World Performance Verification

For more than 30 years, Leviton has offered high-quality network connectivity that's built to last and backed by an industry-leading warranty. We are able to stand behind our products because of rigorous internal testing that ensures our products and systems meet – and often exceed – performance standards from IEEE, TIA, and ISO. This happens inside Leviton's System Verification Lab (SVL), which plays an important role in ensuring cabling systems quality and performance and verifying adherence to standards.

Systems are tested in “worst case” scenarios, so customers know their system will perform as expected in data center and enterprise environments. Testing is performed in Leviton US and UK facilities, using state-of-the-art testers and advanced custom equipment designed in-house. The SVL is made up of engineers and technicians who perform electrical, mechanical, materials, environmental, and quality testing. These experts have decades of experience, and many are active members in standards organizations like IEEE, TIA, and ISO – the groups that define next generation fiber optic and copper networks.

Leviton's SVL invested thousands of hours putting the MILLENNIUM™ ATLAS-X1™ SST system through its paces with rigorous testing, including both thermal cycling and bit error rate testing. As a result of this extensive testing, Leviton's premier global Cat 6A UTP structured cabling system now supports longer, warrantied four (4) connector channel distances, thermal cycled to 60° C (140° F) with 1000BASE-T and Type 1 PoE out to 155 meters (508 feet). The system also supports 2.5 Gbps to 140 m (459 ft) and 5 Gbps to 110 m (360 ft) while providing support for PoE up to 100 Watts.

The SVL emblem signifies that verification was performed by Leviton expert engineers and technicians who follow a rigorous testing process. This ensures cabling systems adhere to quality and performance standards in real-world network environments across the globe.



Installation of the ATLAS-X1™ SST System

Extended Application and PoE Distances

PLENUM (TEKPAK ONLY), RISER, OUTDOOR, CPR	IEEE 802.3 PoE				
	Data Only	Type 1 (15.4 W)	Type 2 (30 W)	Type 3 (60 W)	Type 4 (100 W)
10BASE-T	200 m		140 m		
100BASE-TX	155 m				
1000BASE-T					
2.5GBASE-T	140 m				
5GBASE-T	110 m				
10GBASE-T	100 m				

Application Assurance Terms and Conditions:

- All active equipment must comply with IEEE 802.3 standards throughout duration of operation and be configured to allow link segments that significantly exceed 100 meters to operate.
- All cable and components must be installed in accordance with industry best practices and Leviton's Certified Integrator must perform the installation that will be submitted for warranty.
- Temperature of cabling throughout all segments does not exceed 60 degrees Celsius.
- Channels that exceed 100 meters become application specific and must be operated in full duplex mode.
- Supplies the passive cabling system performance required for stated IEEE application speeds and PoE power delivery when tested to Leviton specific custom limits (Network equipment excluded).
- Leviton's special 25-year application assurance warranty will cover extended distance as per configurations outlined in this System Data Sheet. Leviton application assurance terms and conditions apply.
- Twisted-pair Ethernet applications at link segments longer than 100 meters in length are not standards compliant and therefore there is no guaranteed interoperability or functionality with other components or equipment even if they are standards compliant.

When planning extended distance links, the Ethernet speed and PoE level should be considered. Most security cameras and IoT devices require 10 or 100 Mbps data rates, but their PoE levels vary considerably depending on options such as heater, blowers, PTZ, etc... Most WAPs should have at least 1Gbps data rates and 30W of PoE or less. Future device upgrades should be considered so that the structured cabling will support multiple generations of active equipment. The ATLAS-X1 SST system includes both indoor and outdoor rated cables that can be combined in any combination to create the necessary topology. Indoor rated cables are available in flame ratings that can be installed anywhere in the world. This allows for links to travel through diverse environments on individual sites, and be specified globally for locations anywhere all locations.

Notes:

1. Extended distances listed in the Table are backed by Leviton's 25-year Applications Assurance Warranty when tested to Leviton specified test limits.
2. As active equipment ages, extended distance reach may be reduced.
3. By default, some switches may disable ports if the link is detected to be significantly longer than 100 meters.
4. Extended distance performance requires Leviton modular patch panels and ATLAS-X1™ unshielded 6A jacks only and does not apply to channels with punch-down panels. Actual application performance will vary depending on the switch manufacturer, part number, software, firmware and configuration.
5. The use of 28 AWG patch cords in a modular plug terminated link (MPTL) or channel will void the extended distance application assurance warranty.
6. Any moves, adds, or changes to the channel will require re-testing for warranty coverage to apply.
7. Contact Leviton Application Engineering (US: contractorprograms@leviton.com or EMEA: appeng.eu@leviton.com) to acquire specific test limits and testing procedure.
8. Extended distances for Plenum (CMP) cables in the Table only apply to SST CMP cables packaged in TEKPAK boxes.

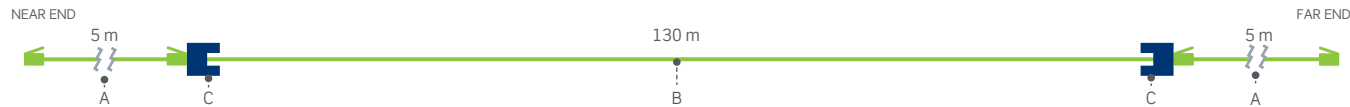
Installation of the ATLAS-X1™ SST System

Indoor Configurations

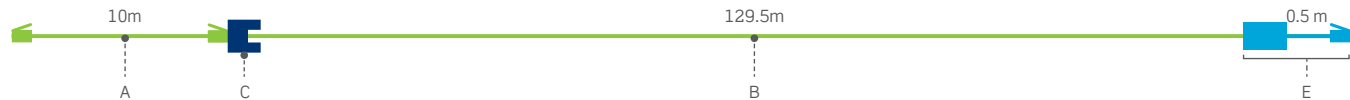
Configuration 1



Configuration 2



Configuration 3

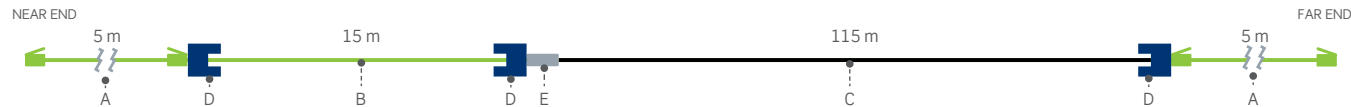


- A:** Patch cord
- B:** Indoor horizontal cable
- C:** Jack
- D:** Plug
- E:** VXC Assembly

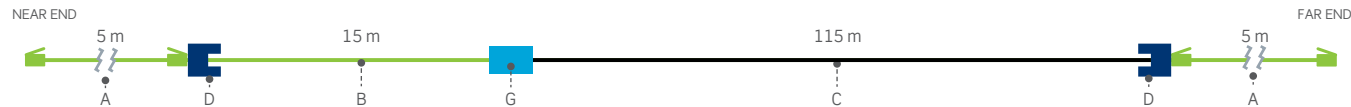
Installation of the ATLAS-X1™ SST System

Outdoor Configurations*

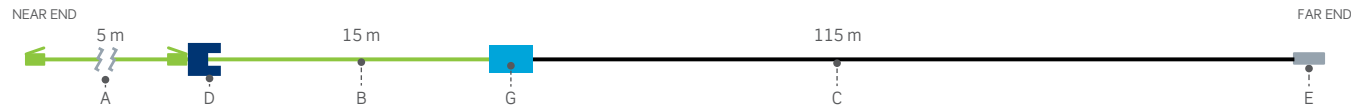
Configuration 1



Configuration 2



Configuration 3



— Indoor cable
— Outdoor cable

A: Patch cord
B: Indoor horizontal cable
C: Outdoor horizontal cable
D: Jack
E: Plug
F: Duraport Cord
G: VXC Coupler

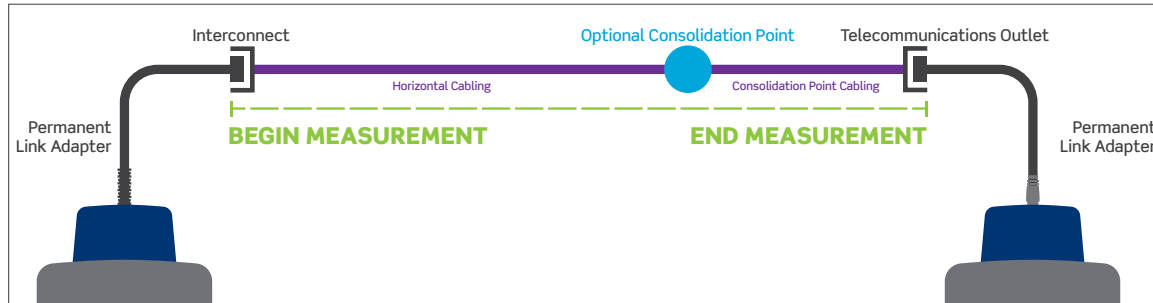
* VXC, Jack, patch cords and plugs must be housed and protected from the outside environment.

Testing and Warranty

Field testing and certification is essential to verify that the installation meets the necessary electrical requirements to support applicable IEEE 802.3 standards intended for use.

Leviton recommends using a test instrument that is capable of accepting custom test limits to perform the required verification test.

The required test set up is as illustrated below:



Installations are tested using Leviton's established permanent link and custom limits.

Please contact Leviton technical support at contractorprograms@leviton.com (North America, LATAM) or appeng.eu@leviton.com (EMEA, APAC) to request the Fluke or Softing custom limits for this extended distance testing.

continued >

Testing and Warranty

OBTAINING AN LEVITON CERTIFIED PROGRAM (LCP) APPLICATION ASSURANCE WARRANTY ON AN EXTENDED DISTANCE PERMANENT LINK (PL) CONFIGURATION

- Applies to MILLENIUM™ system links or channels greater than 100 meters as identified in the Leviton system data sheets (SDS). Only products listed in SDS will be allowed.
- Leviton's Certified Integrator must perform the installation that is being submitted for warranty.
- LCP Integrator logs in to the Leviton warranty portal and completes the warranty application.
- Include a note in the submission that results include extended distance links.
- LCP Integrator uploads a Bill of Material and compliant test results.

- Separate standards compliant (100 m or shorter channel / 90 m or shorter permanent link) from extended distance test results. Consider placing these in a separate project file or folder when submitting.
- Test all extended distance installations to the applicable LCP provided extended distance custom test limit. Test in a Permanent Link or MPL configuration. Channel testing will require prior approval.
- Confirm PoE type needed before selection of test limit.
- Upon completion of the warranty application the project is reviewed and processed.
- Upon approval, a 25-Year Application Assurance Warranty certificate will be issued on the approved extended distance links.

NOTE: Test limits titles refer to Channel length, maximum supported Permanent Link length will be 10 m shorter (accounting for 10 m of Leviton patch-cords), for example the 10BASE-T type-1 200 m limit allows for up to 190 m Permanent Link and up to 10 m of patch-cords for a total of 200 m for the overall Channel.

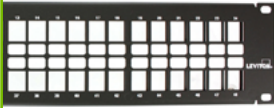
System Components by Region

ATLAS-X1™ Jack



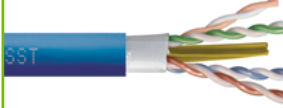
Global

QUICKPORT™
Modular Patch Panel



Global

SST Cable



Global

Cat 6A Standard CMR
Patch Cords



North America

Cat 6A Standard LSZH
Patch Cords



Europe, Middle East,
APAC and Latin America

Cat 6A LSZH CP Cords



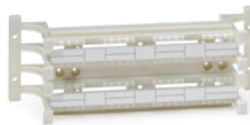
Europe, Middle East, APAC

VXC Coupler



Global

Consolidation Point



Global

Cat 6A Tool-Free Plug



Global

Additional Recommendations and Best Practices

This guide is intended to provide basic guidelines for the installation of Leviton and BERK-TEK™ copper cabling products. The use of this guide is not a substitute for installation training through the Leviton Certified Program (LCP). Installation practices outlined in the latest revision of ANSI/TIA 568.2, ANSI/TIA-569, ISO 11801, and the BICSI TDMM Manual must be followed.

MAXIMUM CABLE LENGTHS

Per the MILLENNIUM™ system data sheet Extended Application and PoE Distances table.

CABLE SLACK

Providing additional cable slack at both ends is recommended to accommodate potential rework.

- Telecommunications closet: 3 meter (10 feet)
- Telecommunications outlet: 30 cm (12 inches) for twisted pair cables

MAXIMUM CABLE PULL FORCE

UTP Cables: 110 N (25 lbf)

MODULAR PLUG TERMINATION LINK (MPTL)

Follow Leviton MPTL installation and testing guidelines when installing links with a Jack to Plug configuration.

HANDLING OF CABLE

Reel/Reel Boxes/Reelex Boxes must be stored and handled in an upright position to reduce the chance of twisting and kinking the cable.

CABLE BEND RADIUS

No less than 4 times the cable diameter

CABLE MANAGEMENT AND PULLING PRACTICES

Eliminate cable stress:

- Control tension in suspended cable runs by limiting spans between supports to 1.5 m (5 ft.) or less, per ANSI/TIA-569's requirements.
- Avoid tightly cinched cable bundles.
- Avoid kinking during installation and dressing the cable.
- Avoid changing the geometry of the cable.
- Follow manufacturers' recommendations for loading cable trays and j-hooks.
- The use of tie wraps should be avoided.
- Avoid EMI/RFI sources.
- When pulling cable, apply pulling force evenly to all conductors in the cable.
- Avoid exceeding the minimum bend radius of the cable.

CONNECTOR TERMINATION

Follow Leviton's guidelines for termination of Leviton's connectors and patch panels.

Today's networks must be fast and reliable, with the flexibility to handle ever-increasing data demands. Leviton can help expand your network possibilities and prepare you for the future. Our end-to-end cabling systems feature robust construction that reduces downtime, and performance that exceeds standards. We offer quick-ship make-to-order solutions from our US and UK factories. We even invent new products for customers when the product they need is not available. All of this adds up to the **highest return on infrastructure investment.**

Network Solutions products are **available worldwide** in **over 100 countries**. Visit us online at leviton.com/ns to learn more.



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USA — NETWORK SOLUTIONS HEADQUARTERS

2222 - 222nd Street S.E., Bothell, WA, 98021, USA
+1 (800) 722 2082 | infoUSA@leviton.com | Leviton.com/NS

Customer Service
+1 (800) 722 2082
insidesales@leviton.com

International Customer Service
+1 (800) 722 2082 (Option 1)
intl@leviton.com

BERK-TEK™ Cable
+1 (800) 237 5835
infoUSA@leviton.com

Technical Support
+1 (800) 722 2082
appeng@leviton.com

APAC

+85 (2) 3620 2602 | infoAPAC@leviton.com | Leviton.com/NS

Customer Service
+1 (631) 812 6228
infoASEAN@leviton.com

China
+85 (2) 2774 9876
infoChina@leviton.com

South Korea
+82 (2) 3273 9963
infoKorea@leviton.com

CANADA

+1 (800) 461 2002 | infoCanada@leviton.com | Leviton.com/NS

Customer Service
+1 (514) 954 1840
pcservice@leviton.com

MIDDLE EAST & AFRICA

Bay Square, Building 3, Office 205, Business Bay, Dubai, UAE
+971 (4) 247 9800 | infoMEA@leviton.com | Leviton.com/NS

Customer Service
+971 (4) 247 9800
lmefinfo@leviton.com

EUROPE

Viewfield Industrial Estate, Glenrothes, KY6 2RS, UK
+44 (0) 1592 772124 | infoEurope@leviton.com | Leviton.com/NS/EMEA

Customer Service
+44 (0) 1592 772124
customerserviceEU@leviton.com

Technical Support
+44 (0) 1592 778494
appeng.EU@leviton.com

Benelux
+44 (0) 1592 772124
infoBenelux@leviton.com

Nordics & Baltics
+46 (70) 9675033
infoNordics@leviton.com

Central & Eastern Europe (CEE)
+44 (0) 1592 772124
infoCEE@leviton.com

Spain & Portugal
+34 (91) 490 59 19
infoSpain@leviton.com

DACH
+49 (0) 173 272 0128
infoDACH@leviton.com

UK & Ireland
+44 (0) 1592 772124
infoUKandI@leviton.com

France
+33 (0) 1709 87826
infoFrance@leviton.com

Italy
+39 (02) 3534896 (Milan)
+39 (06) 68584613 (Rome)
infoitaly@leviton.com

LATAM

infoLATAM@leviton.com | Leviton.com/NS

Customer Service
+52 (55) 2333 5963
infoLATAM@leviton.com

Caribbean
+1 (954) 593 1896
infoCaribbean@leviton.com

Mexico
+52 (55) 2128 6286
lsamarketing@leviton.com

Colombia
+57 (1) 743 6045
infoColombia@leviton.com