LEVITON®

OneReach™ System

Installation Manual

HAZARDS AND WARNINGS

IMPORTANT INSTRUCTIONS

When using your communications equipment, basic precautions should always be followed to reduce the risk of fire, electric shock, and injury to persons, including the following:

1. **WARNING: TO AVOID DEATH OR INJURY**, never push objects of any kind into this product through openings, as they may touch dangerous voltages.

2. Read and understand all instructions.

3. Follow all warnings and instructions marked on the product.

4. Do not use this product near water — e.g., near a tub, wash basin, kitchen sink or laundry tub, in a wet basement, or near a swimming pool.

5. **SAVE THESE INSTRUCTIONS.**

SAFETY INFORMATION

1. Never install communications wiring or components during a lightning storm.

2. Never install communications components in wet locations unless the components are designed specifically for use in wet locations.

3. Never touch uninsulated wires or terminals unless the wiring has been disconnected at the network interface.

4. Use caution when installing or modifying communications wiring or components.

WEB VERSION

1 PRODUCT DESCRIPTION

The OneReach™ System is an integrated data and power cable solution capable of supporting single or multiple remote Power over Ethernet (PoE) devices beyond the conventional 100 meters (328 feet) from the communications closet. Available OneReach system options can extend PoE to over 1,000 meters (3,280 feet). The OneReach System is designed to provide:

• Centralized power control with back-up.
• Up to 1 Gb/s Ethernet links through a simplified network that is both easy and economical to install.

1.1 Technical Specifications

Standards
• IEEE 802.310/100/1000BASE-T, 1000BASE-X
• IEEE 802.3 Power over Ethernet, up to Type 4, Class 8

Compliance
Safety: UL 60950-1
Radiation: CFR FCC Part 15 Class A

2 SYSTEM INSTALLATION

2.1 Overview

The system consists of three parts: Power Injection (PI), the OneReach Cable Assembly (OCA), and the Remote PoE Port (Remote). The variety of available components allows you to build a custom system for your exact needs – each is designed to work together for ease of use and a streamlined installation.

If any of the OneReach components or devices supported by OneReach are or will be located outdoors or subject to electrical surges, **see Sections 3.5, 3.6, and 3.7 for important grounding and surge suppression information.**

2.1.1 Power Injection

Power Injection starts from the Power Injection Chassis or the PI Source on single channel systems (described later). The rack mountable chassis, located in a local closet, accommodates the slide-in 4-port Media Modules and injects the power and the data from active networking equipment into a hybrid fiber optic and copper cable. The power supply is compliant with the requirements for Class 2 per NFPA 70-2017 when used as part of the OneReach system.

The 2U chassis with rear terminal blocks has a capacity of six single-sized slots and accepts one to three power supplies plus up to five media modules. Each slide-in Media Module supports four Ethernet ports. Each chassis requires at least one power supply.
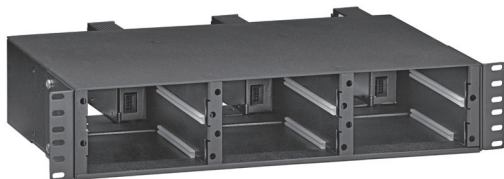
Power Injection Chassis

Slide-in Power Supply Modules (PSM) provide 250W of power from each AC input and are equipped with active ventilation. Each PSM supports twelve PoE, eight PoE+, four PoE++ (60W), or two PoE++ (100W) devices. At least one PSM is required, with multiple PSM's specified when required for additional power. The maximum number of PSMs in any one chassis shall be three. The screw terminals cannot be used to wire chassis together, nor should other means be used in an attempt to transfer power between chassis.
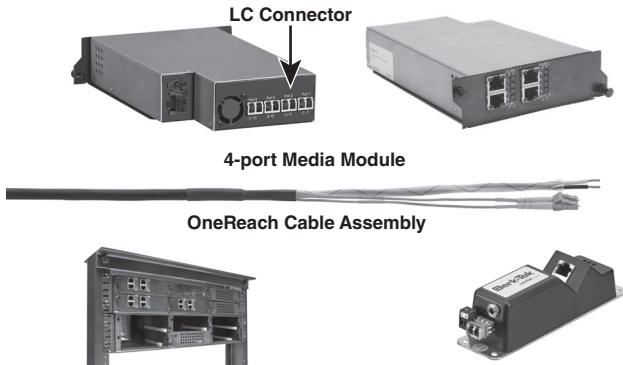

Power Supply Module

2   SYSTEM INSTALLATION

The slide-in **Media Modules** provide various configurations of media conversion for 10/100/1000 Mb/s network links to VoIP phones, wireless access points, security cameras, and other devices. Each media conversion channel includes: rear panel LC optical ports, front panel RJ-45 ports for the copper and indicator LED's for fiber link, and copper link. Blank filler plates are available for unused module positions.

The single channel systems use the 1-port Source, mentioned earlier, as both the source and media converter (see Part 2 Installation Instructions; item D).

LC Connector

4-port Media Module

OneReach Cable Assembly

Mounted 2U Chassis (2), top loaded with (1) Power Supply Module, (3) Media Modules, and (3) Blanking Panels. Bottom Chassis unloaded for future installations.

1-port PI Source

2.1.2 Pre-Terminated OneReach Cable Assemblies (OCA)

Pre-Terminated OneReach Cable Assemblies (OCA) provide a common pathway for data transmission and Class 2 power supply in a single pull installation. The OCA consists of a Berk-Tek CL3R-OF/PLTC-OF or CL3P-OF/PLTC-OF rated composite copper/fiber cable, within a single jacket, which includes 12 AWG solid conductors coupled with either tight-buffered or loose-tube optical fibers. All cables are indoor/outdoor rated to support routing between telecommunication closets and outdoor locations for IP-cameras, WAPs, emergency call boxes, and other IP-based devices. Since the cable is listed as CL3R-OF/PLTC-OF or CL3P-OF/PLTC-OF, it can be installed in the same pathways as other low voltage cables. Bulk cable is also available for field termination.

Assemblies are built to specific length requirements for each project with pre-terminated fiber connectors. A power pigtail with a preterminated M8 connector for power on the Remote is field installed after the cable is pulled in. Assemblies use OM3 or OS2 optical fiber and LC (2 fiber, 4 fiber, or 8 fiber) optical connectors to support single and multi-port applications.

M8 Pigtail

2 SYSTEM INSTALLATION

2.1.3 Remote PoE Ports (Remotes)

Remote PoE Ports (Remotes) are avalable in 1-port, 2-port, and 4-port versions. Remotes are available to support PoE, PoE+ and PoE++ (up to PoE Type 4, Class 8) devices with speeds up to 1 Gb/s. IP-based devices with appropriate power requirements may be connected to remote PoE ports with standard RJ-45 terminated patch cords. See tables below for power utilization by remote port count and type.

1-port Remote	
PoE Type	Port 1 Maximum Power
Type 1	15.4 W
Type 2	30 W
Type 3	60 W
Type 4	100 W

2-port Remote		
PoE Type	Port 1 Maximum Power	Port 2 Maximum Power
Type 1	15.4 W	15.4 W
Type 2	30 W	30 W
Type 3	60 W	30 W
Type 4	100 W	Data-Only

4-port Remote				
PoE Type	Port 1 Maximum Power	Port 2 Maximum Power	Port 3 Maximum Power	Port 4 Maximum Power
Type 1	15.4 W	15.4 W	15.4 W	15.4 W
Type 2	30 W	30 W	30 W	30 W
Type 3	60 W	30 W	60 W	30 W
Type 4	100 W	Data-Only	100 W	Data-Only

1-port Remote   **2-port Remote**   **4-port Remote**

Assembly Length

Prior to ordering, use a metered pull tape in the conduit system to ensure that assemblies are the correct length. Once the length of the conduit is determined, add 1% for measurement error, plus the additional length needed to reach appropriate rack(s) and create desired service loops. For example, if the metered tape result shows 500 ft (152.5 m):

Example Length Calculation	
Tape Results	500 ft (152.5 m)
1% for measurement error	+5 ft (+1.5 m)
Extension past conduit	+10 ft (+3.0 m)
Service Loops	+15 ft (+4.5 m)
Total assembly length	530 ft (161.5 m)

3.1 Cable Installation

3.1.1 Ensure that the conduit system size is large enough to accommodate the cable.

a. OneReach Cable Assemblies follow the same fill-ratio standards as all other low-voltage cable installations.

b. The maximum amount of space that the installed cables should occupy in a given size conduit is defined as follows:

    i. A single cable is allowed to occupy up to 53% of the cross-sectional area (CSA) inside of a conduit.

    ii. Two cables can occupy 31%.

    iii. A 40% maximum fill ratio is mandated for three or more cables.

c. If you do not have ready access to a fill-ratio calculator, the CSA can be manually calculated by squaring the outside diameter of the cable (inside diameter of the conduit for conduit CSA), and then multiplying the total by 0.7854.
NOTE: The number 0.7854 is arrived at by dividing π by four ($3.1416 \div 4 = 0.7854$).

d. Add the total of the cable CSA's together.

e. Divide the total cable CSA by the conduit CSA.

NOTE: The cable's pulling eye will need to fit into the conduit. Please see the OCA's product spec drawing for the pulling eye outer diameter (OD). For example, if the pulling eye has a 0.8 inch OD, then a minimum Trade Size 1 in. conduit will be needed.

3.1.2 Stage pre-terminated cable at the remote location.

a. The pulling eye will be attached to the top end of the reel.

b. The cable must be placed on an axle that will allow the cable to easily unwind during the pulling operation.

c. The cable should pull off the top of the reel.

WEB VERSION

3.1.3 Use pulling eye to pull cable from the remote location enclosure through the conduit to the closet.

a. The use of a preinstalled pulling rope will facilitate this step.

b. Bend limiting devices (pulleys) **must** be used in areas where there may be a sharp bend.

3.1.4 Gently remove the pre-terminated cable end from the reel and its protective sock.
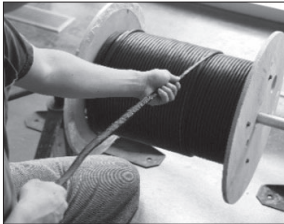
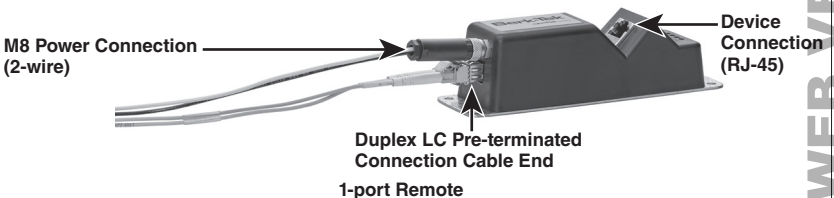**Pull grip with Pulling Eye Loop on end (first to come off)**
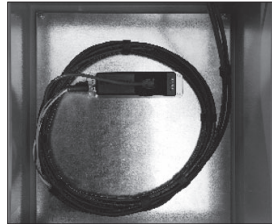
Pulling Eye

3.2 Remote Location Installation of the 1-port, 2-port, or 4-port Remote

3.2.1 An appropriately rated NEMA 4 or better enclosure is required in any location where the remote may come into contact with rain, other liquids, or be subjected to condensation. Leave about 1 meter (3 ft.) of the pre-terminated end of the cable inside the NEMA box and pull the opposite end through to the closet. The cable should be routed in a circle around inside edge of box, while maintaining the minimum bend radius.

3.2.2 Mount the remote towards the top of the back plate of the enclosure with four appropriate #8 screws. Unless the remote is to be fastened directly to grounded metal, place a ground lug under one of the 4 mounting screws and route to appropriate grounding point via minimum #12 bonding conductor **(See section 3.5)**.
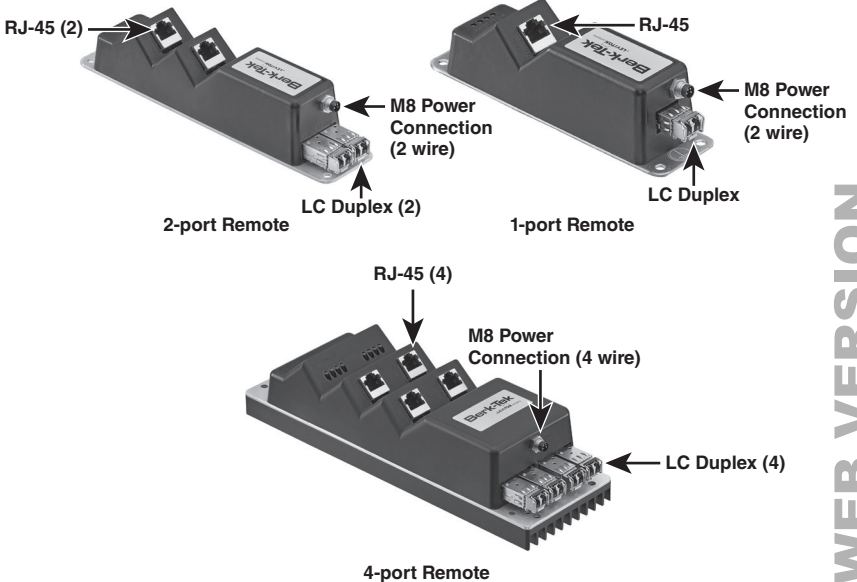

M8 Power Connection (2-wire)

Device Connection (RJ-45)

Duplex LC Pre-terminated Connection Cable End

1-port Remote

3 INSTALLATION INSTRUCTIONS

3.2.3 Remove fiber dust caps and clean connector end faces with a fiber optic microfiber dry cleaner.

3.2.4 Connect the appropriate M8 pigtail to the copper conductors on the OCA. Surge Suppression is strongly recommended, see page 14.

3.2.5 Connect the pre-terminated LC duplex connectors and the M8 connector to the Remote. Ensure the cable loops easily around the box and that there are no tight bends in the fibers (minimum bend radius is about 10 cm [3.9 in]).

3.2.6 Connect the remote powered device to the remote with a RJ-45 terminated patch cord. Use a cable grip if required. Up to 100 m (328 ft.) of appropriate category cable may be extended from the Remotes RJ-45 port.

OneReach Cable Assembly

RJ-45 (2)

RJ-45

M8 Power Connection (2 wire)

M8 Power Connection (2 wire)

LC Duplex (2)

LC Duplex

2-port Remote

1-port Remote

RJ-45 (4)

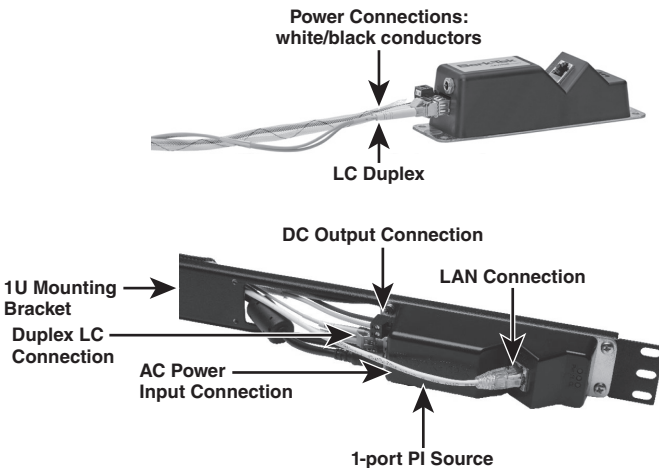**M8 Power Connection (4 wire)**

LC Duplex (4)

4-port Remote

WEB VERSION

3 INSTALLATION INSTRUCTIONS

3.3 Hook-up for the 1-port PI Source

3.3.1 Route hybrid cable to location where the PI Source is to be mounted.

3.3.2 Mount the PI Source using four appropriate #8 screws to the 1U mounting bracket. Unless the Source is to be fastened directly to grounded metal, place a ground lug under one of the 4 mounting screws and route to appropriate grounding point via minimum #12 bonding conductor **(see section 3.5)**.

3.3.3 With no power applied to the PI source, attach conductors to the appropriate terminal one at a time and tighten each terminal screw of the dual terminal block. Surge Suppression is strongly recommended, see page 14.

3.3.4 Connect the terminated LC duplex connectors to the PI Source.

3.3.5 Make the network connection to RJ-45 connector.

3.3.6 Remove fiber dust caps and clean connector end faces with a fiber optic cleaner. Plug in duplex LC connector.

3.3.7 Connect either the barrel (or M8) connector from the AC power supply to the PI Source.

3.3.8 Plug the power supply into the AC outlet.

3.3.9 Ensure that the PI Media Source "Pwr" LED Indicator is illuminated.

**Power Connections:
white/black conductors**

LC Duplex

DC Output Connection

LAN Connection

1U Mounting Bracket

Duplex LC Connection

AC Power Input Connection

1-port PI Source

WEB VERSION

3.4 Closet Installation for the 4-port PI Media Module

3.4.1 Route cable in the closet to the rear of the Power Injection Chassis, accounting for proper bend radius. For pre-terminated assemblies, route excess cable in slack management at the side or rear of the rack.

3.4.2 Terminating the bare end of pigtail assemblies only.

a. Cut cable to appropriate length so there is an extra six feet of cable available. Note that some surge protectors require additional distance between the cable end and the chassis/Remote. This may require more cable length to be prepared.

b. Strip back the cable jacket at least one foot and terminate the fibers with appropriate connectors.

c. With the copper conductors approximately the same length as the fibers, strip about 1/4 inch of insulation from copper conductors. Keep any excess copper conductor, as it may be needed for use with a surge protector.

3.4.3 Shut off the power to the chassis using the rear switches of all power supplies in the chassis.

3.4.4 Match the copper conductor to the color identification on the terminal block. Insert the stripped conductors one at a time, and tighten each terminal screw.

WARNING: TO AVOID INJURY OR DEATH, be sure the chassis has all power supplies shut off before hooking up a cable and that the wire colors match the terminal block identification.

a. Each screw down terminal has at least a B and W position. Each conductor pair uses a single terminal block. The table below provides the conductor termination guide; conductor pairs are shown by row in the below table.

| B Terminal	W Terminal
Black	White
Blue	Yellow
Brown	Orange
Purple	Pink

3.4.5 Remove fiber dust caps and clean connector end faces with a fiber optic microfiber dry cleaner. Plug the LC connectors into the appropriate connectors on the rear of the Media Modules.

3.4.6 Connect the desired network equipment to the RJ-45 ports on the front of the Media Modules to communicate with the remote end devices.

3.4.7 Plug in and turn on all power supplies in the Power Injection Chassis.

WEB VERSION

3.4.8 Ensure that all the Power Supply "Power On" indicators are illuminated.
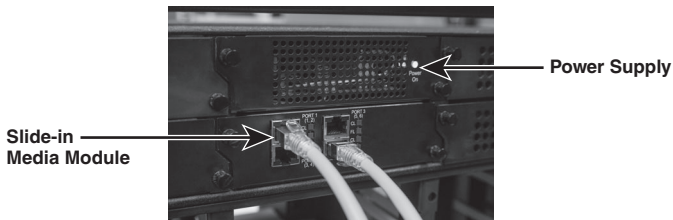
**Equipment Connections
(e.g. Ethernet switch, server, NVR)**

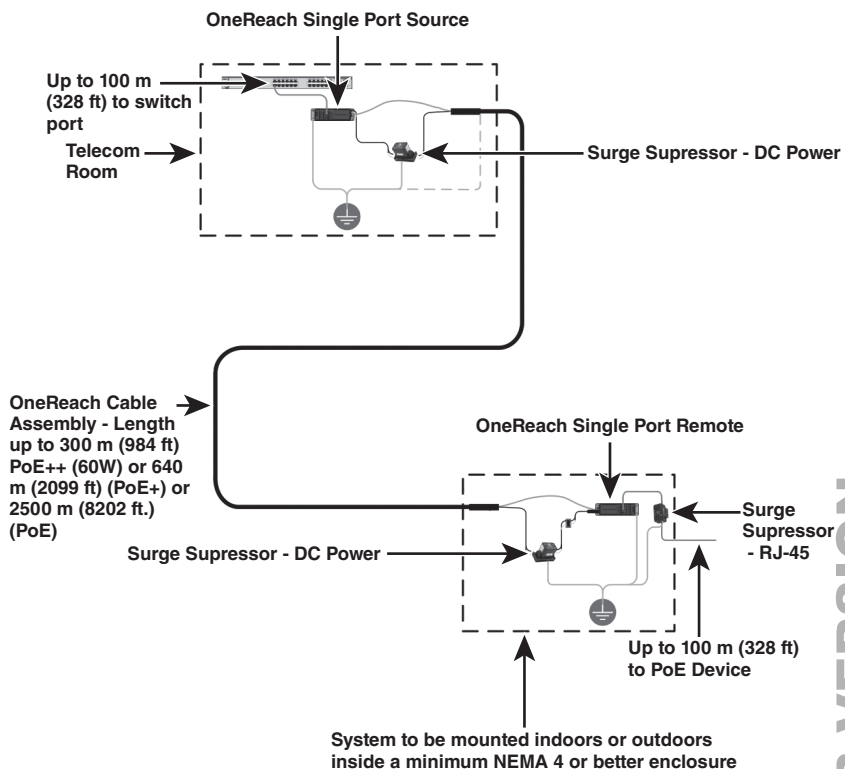3.4.9 Ensure the Remote "Pwr" Indicator is illuminated.

3.4.10 Blue "FL" LED's on the slide-in Media Module indicate that the fiber port
        is linked between the two locations.

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3   INSTALLATION INSTRUCTIONS

3.5 Grounding

A basic OneReach circuit diagram is provided below for informational purposes.
To minimize potential for circulating ground current, the electronics and hybrid power conductors are isolated from the chassis ground, except for transient voltage suppressor (TVS below) protection devices.


OneReach Single Port Source

Up to 100 m (328 ft) to switch port

Telecom Room

Surge Supressor - DC Power

OneReach Cable Assembly - Length up to 300 m (984 ft) PoE++ (60W) or 640 m (2099 ft) (PoE+) or 2500 m (8202 ft.) (PoE)

OneReach Single Port Remote

Surge Supressor - RJ-45

Surge Supressor - DC Power

Up to 100 m (328 ft) to PoE Device

System to be mounted indoors or outdoors inside a minimum NEMA 4 or better enclosure

WEB VERSION

3.6 System Grounding

Both the PI source and the remote have internal surge suppression devices, which shunt common mode power surge power that may be induced in the hybrid cable to ground. Transient voltage suppression is part of the circuit, but the base plates at both ends of a circuit must be grounded to facilitate surge voltage protection. Proper installation ensures that the surge suppression will operate as intended.

Ground Lead   **M8 Connector**
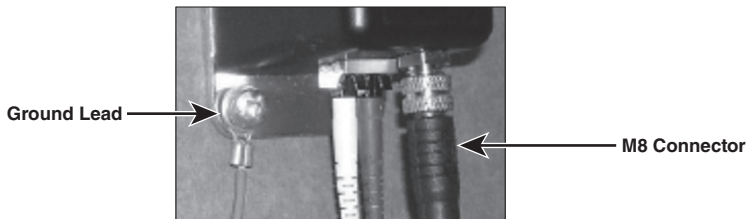
The installer must mount the OneReach units such that the base plates are connected to local ground. This is done by using grounding screws (not supplied) to secure the metal base of the PI source or remote to a mounting plate connected to an approved ground.

If the PI source or remote cannot be connected directly to a grounded plate, a ground wire with grounding lug (not supplied) must be used. The ground lug and wire must be installed between the base plate and the ground screw, and tightened securely. The other end of the ground wire is connected to an approved earth ground. Use a copper ground wire, minimum 12 AWG (not supplied). Be sure the OneReach system is properly grounded prior to applying power.

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3.7 Surge Protection

For all applications where remote devices are outdoors, 48 VDC surge protectors are strongly recommended. Leviton strongly recommends additional surge suppression be added to the Category cables running to the powered device as well as a high power grounded surge suppression device be installed at the source end of the hybrid cable. Specific installation guidelines are dependent on the surge protection device selected and the network design. **See section 3.5** for a reference to a basic OneReach circuit diagram.

WEB VERSION

4   STANDARD STATEMENTS AND WARRANTY

For Leviton Standard Limited 1 Year Warranty and Technical Assistance visit www.leviton.com/ns/support or Call 1-800-824-3005.

FOR CANADA ONLY

For warranty information and/or product returns, residents of Canada should contact Leviton in writing at **Leviton Manufacturing of Canada ULC** to the attention of the **Quality Assurance Department, 165 Hymus Blvd, Pointe-Claire (Quebec), Canada H9R 1E9 or by telephone at 1-800-405-5320.**

Patents covering this product, if any, can be found on Leviton.com/patents.

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