Co

Building + Mounting

## Gather Tools and Wireless Equipment

Introduction

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In this module you will find a list of suggested tools and equipment for wireless installations. It includes many common hand and power tools that you or someone you know may already have, so do not feel that you have to purchase all of these! Some items are also listed as optional — these may make some installations easier, but are not required. There is also a list of some wireless routers and mounting kits, but you should pick one based on the specific installation you are performing.

How to use this module: Read through the material and determine if you need to purchase any tools, hardware or equipment. This should take less than an hour. Finding some of the items may take some more time. We have included specific part numbers for some harder-to-find items, but keep in mind items are occasionally discontinued or renumbered.

This module should be considered a companion to **"Prep and Install Rooftop Nodes, Learn about Rooftop Mounts,"** and **"Learn Rooftop Basics."** There are many references in those documents to tools and equipment in this module.
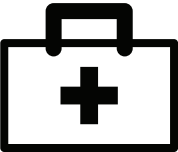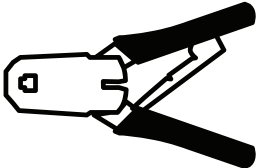
Time required: less than 1 hour.

Tool Bag

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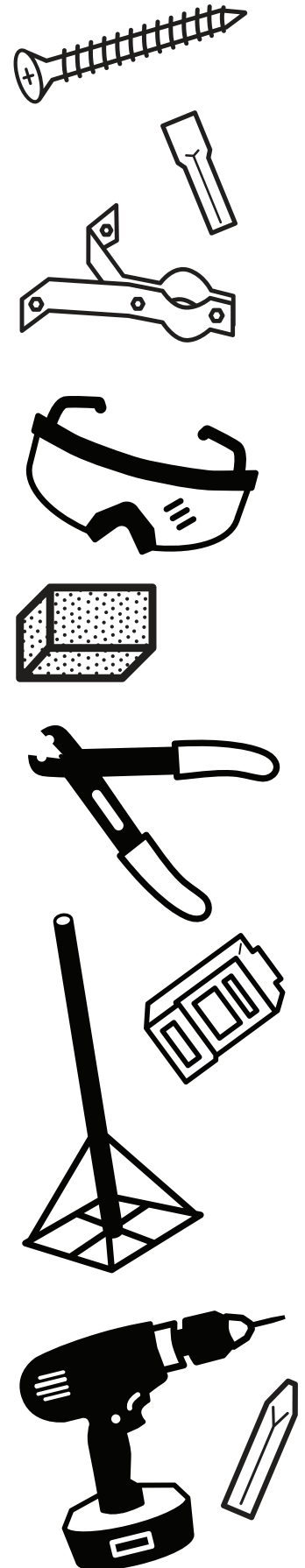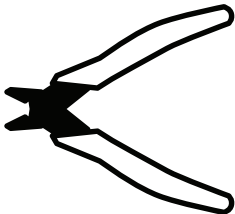
Everything below is recommended for your tool bag, but **shaded items are optional** — you may not need them for your specific installation.
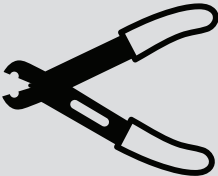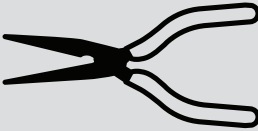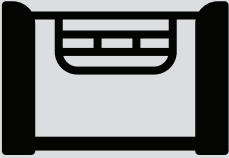
Item		Detail	Price
	Tool bag	Any 18" tool bag should be large enough	$45
	First Aid kit	Any compact, portable first aid kit	$30
	RJ-45 Crimper	EZ-RJPRO HD from Platinum Tools	$70
	6-in-1 Screwdriver		$10
	8" Adjustible box wrench		$10

3   TOOL BAG, CONTINUED

Item			Price
	Utility knife (box cutter)		$10
	Edge cutters		$10
	Measuring tape		$10
	Eye protection glasses		$5
	Ear plugs		$5
	Flashlight or headlamp		$15
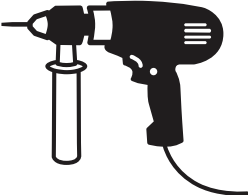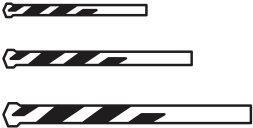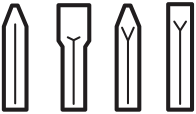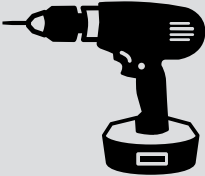
4   TOOL BAG, CONTINUED

Item			Price
	Cable stripper	CAT5 cable jacket stripper, part # 15015	$14
	8" Side-cutting box pliers		$10
	8" Needle-nose pliers		$10
	Small magnetic level		$10
	Cable tacker staple gun	Arrow Fastener T59 Wiring Tacker	$40
		Subtotal for hand tools:	**$329**

<u>Drilling Tools</u>

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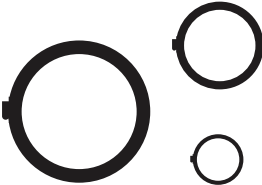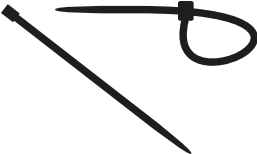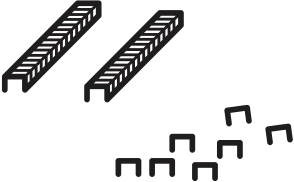
Often cables must be run through masonry or brick walls, and mounting hardware must be installed on outdoor masonry walls. **Shaded items are optional.**

Item			Price
	Hammer drill (corded)	Less expensive option — standard corded drill	$70
	Masonry drill bits	For concrete, brick or stone (Note: not SDS bits)	$20
	Regular drill bits	Any set of wood and metal drill bits	$15
	Heavy-duty driver bits	Standard flathead and Phillips driver bits	$5
	Hammer drill (cordless)	More expensive — 18V cordless or equivalent	$200
	12" or longer masonry bit	½" bit for thick walls — rated for concrete, brick or stone (Note: not SDS bits)	$10
			$320

<u>Consumables</u>

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These items are used to attach or fasten equipment or cabling in place. You will use them up as time goes on, and will need to purchase more. **Shaded items are optional.**

Item		Detail	Price
	Masonry screws	Box of 75 for $21 — you will drop and lose many screws	$0.30
	2" Hose clamps	To attach router to mast	$5
	Zip ties	Set of 6" and 12" UV-rated ties	$25
	Cable tacker staples	Arrow Fastener 591189 — 5/16" insulated staples	$8
			$50

Total for Hand and Drilling Tools: **$675**

Wireless Equipment

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The next section details different types of wireless equipment and the mounting hardware you can use to attach it to the roof of a building. The diagram below shows how all the various elements go together, but for determining what equipment and mounts are best for a specific home or building, please see **"Determine Installation Needs," "Learn about Rooftop Mounts,"** and **"Learn Rooftop Basics."**

RESIDENTIAL HOME

COMMUNITY BUILDING

APARTMENT BUILDING

BUILDING
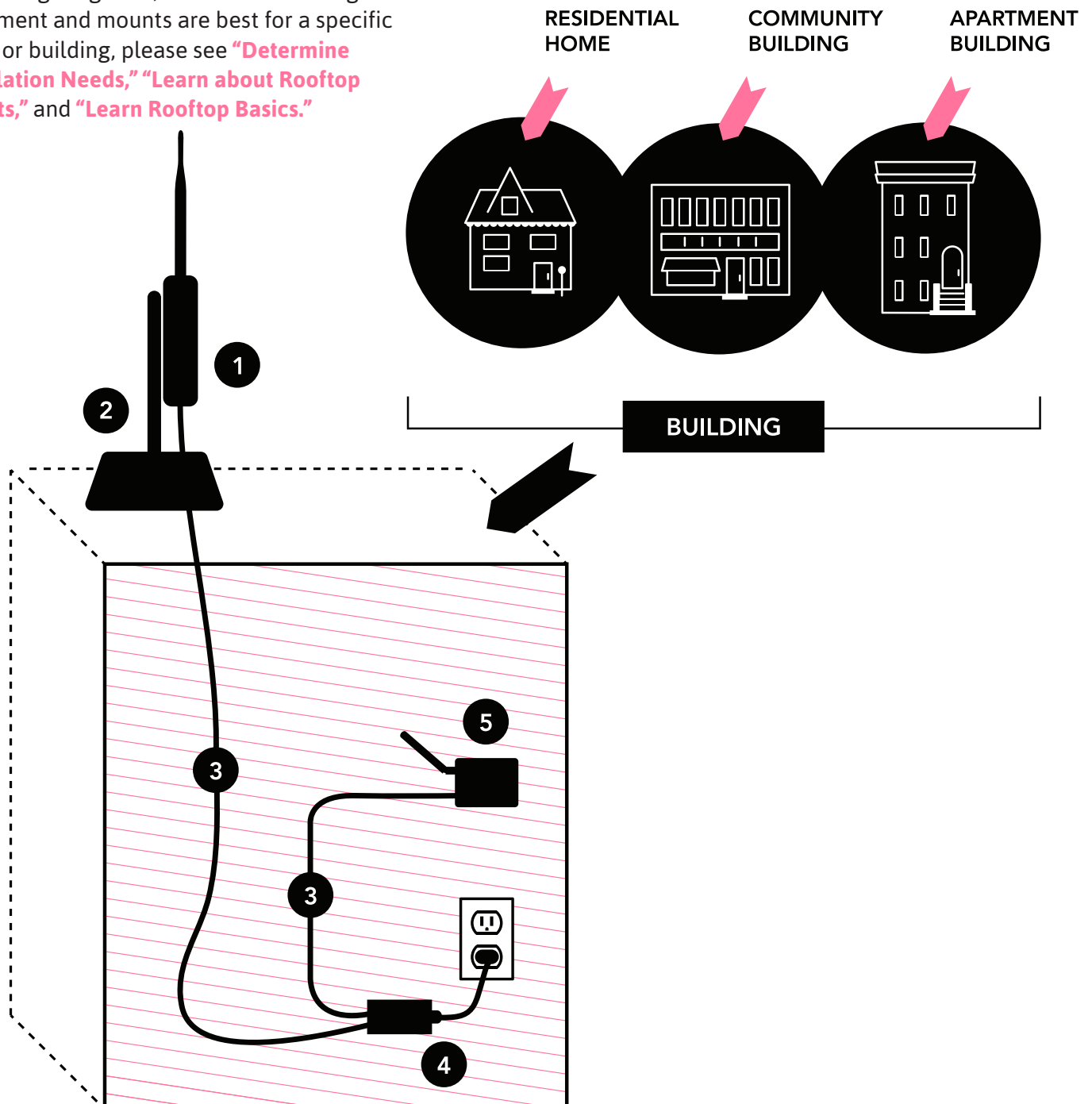
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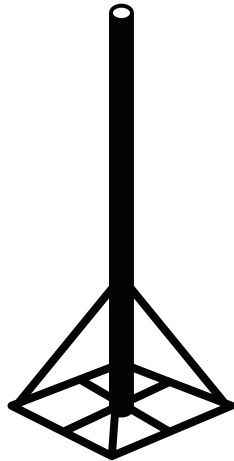
1. WIRELESS NODE

2. ROOF MOUNT
For specific hardware, consult the
"Learn about Rooftop Mounts"
module.

3. ETHERNET CABLE
Spool of 1000 feet is around
$150. A single install may use
only 50-100 feet of a spool.

4. POE (POWER OVER ETHERNET)
Comes with wireless node.
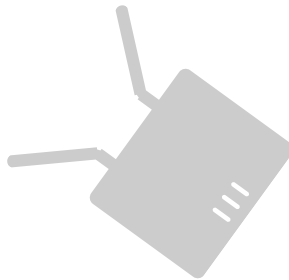
5. INDOOR ROUTER
(Optional)
This item is provided by the
community member.

There are two possible ways to
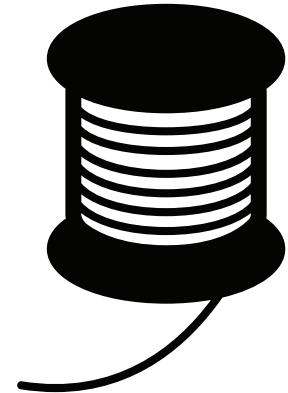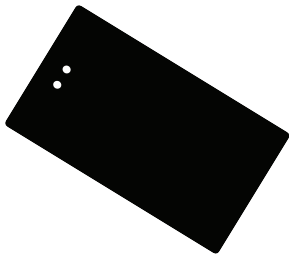connect this router to the Internet:

If the Commotion node is plugged-in to
the router's LAN (inside network) port,
and there is a modem or connection
to the Internet plugged in to the WAN
port, an Internet connection will be
shared to the neighborhood mesh.

If the Commotion node is plugged-in
to the router's WAN (Internet) port,
the connection to the Internet will be
provided by the neighborhood mesh.
This requires your neighbors to be
donating one or more connections to
the mesh. If there is no connection to
the Internet, you can use the network
as a local "Intranet," or local network.

<u>Wireless Equipment</u>
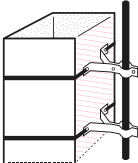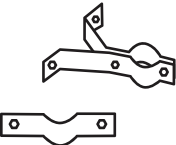
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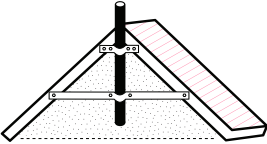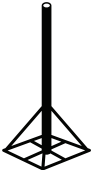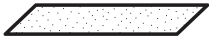
For a standard installation, select one of the Ubiquiti routers per site. Add an indoor router to extend coverage inside the building. Estimate the number of feet of cabling to connect the routers to each other and the Ubiquiti router to the power source, with two RJ-45 ends per cable (plus some extra, just in case).

Item		Detail	Price
	Short range, omnidirectional router	Ubiquiti PicoStation	$45
	Medium range, directional router	Ubiquiti NanoStation	$30
	Long range, high power router with antenna options	Ubiquiti Rocket + Antenna	$200
	RJ-45 Ends	CAT5/5e 100-piece jar for $60, part #202003J	$10
	Spool of Ethernet cable	Outdoor CAT5e, Ubiquiti TC-PRO, (spool of 1000 feet)	$65
	Basic indoor router	Linksys WRT54GL	$50
		Subtotal, per building:	**$80-$250**

Mounting Hardware

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Typically you will need one mast, two hose clamps, and one mounting kit per building that has exterior equipment. For more information on specific types of mounts, please see **"Learn about Rooftop Mounts."**

Item			Price
	5' steel mast or pipe	Radio Shack — Antennacraft 5' 18-gauge mast	$14
	Chimney mount kit	Winegard CM-2012 kit (wraps around chimney)	$25
	Wall mount kit	Channel Master CM-9034 (requires drilling holes and using masonry screws)	$10
	Eaves mounting kit	Winegard SW-0012 (for the edge of a roof)	$10
	Non-penetrating mount	VMP FRM-125 (for flat roofs)	$10
	Rubber mat	NPRMAT8 (to protect roofs under non-penetrating mount)	$10
	Cinder blocks	Required as ballast for non-penetrating mount	$10
		Subtotal, per building:	**$30-$120**

Definitions

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PoE: Power over Ethernet. Systems which pass electrical power along with data on Ethernet cabling.

LAN: Local Area Network. In this case, a computer network covering a small local area, such as a home or office with Ethernet cables or wireless signals.

WAN: Wide Area Network. In this case, this signifies the connection to the global Internet.

Related Information

To calculate the cost of your installation, use this spreadsheet: **"Gather Tools and Equipment Spreadsheet."** You can either print the spreadsheet out or use it on your computer.

This module should be considered a companion to **"Prep and Install Rooftop Nodes," "Learn about Rooftop Mounts,"** and **"Learn Rooftop Basics."**

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