HomeGrid
FORUM®

"As IOT in the consumer sector experience wireless crowding, are backbones the key to its savior"…

www.homegridforum.org

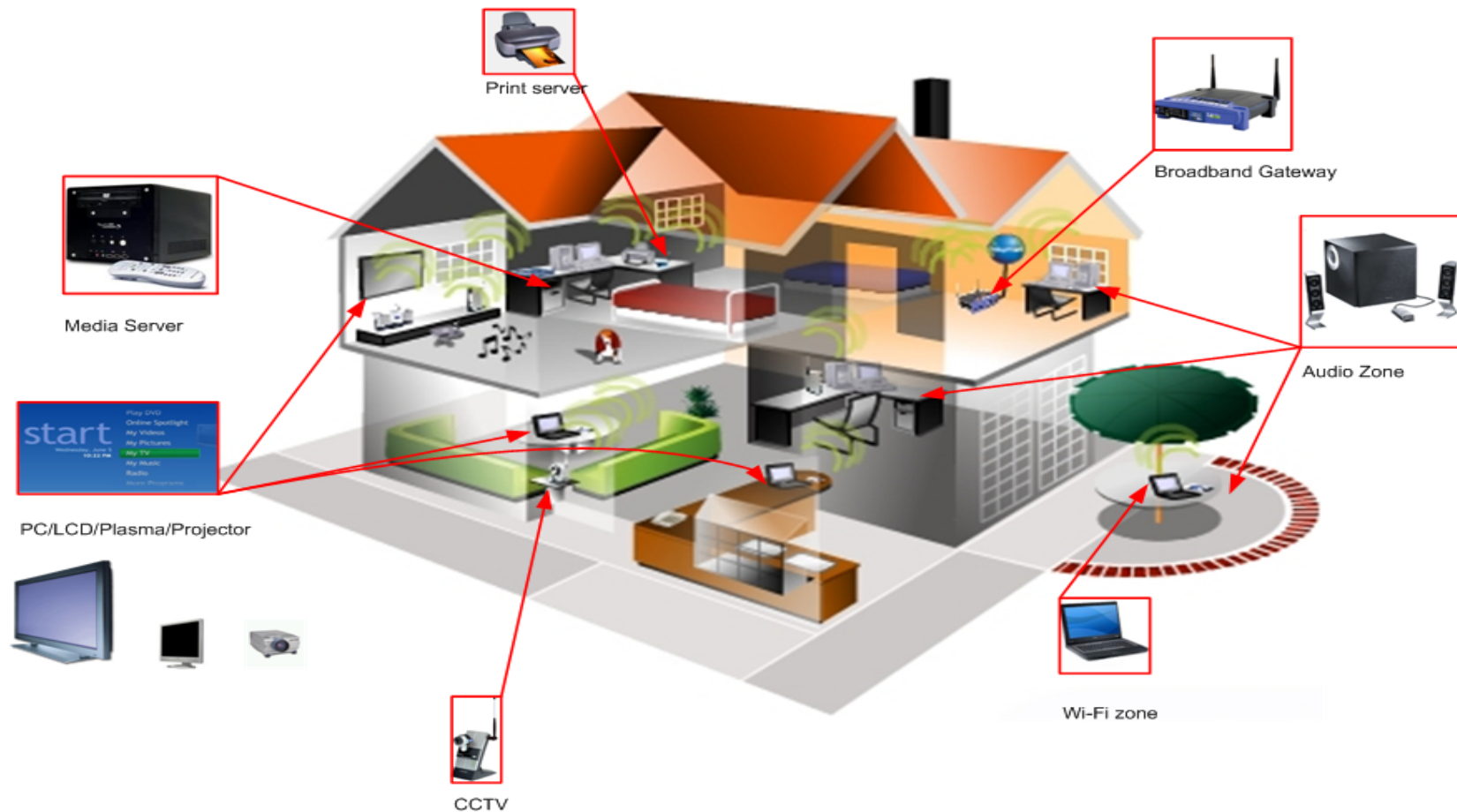**IoT Slam'16**®
Internet of Things Conference
April 28th 2016

Powerline

Coax

Phone

Donna Yasay
President, HomeGrid Forum
IOT SLAM 2016

IOT in the Digital Home

Digital Home Network
Wired and Wireless

Print server

Broadband Gateway

Media Server

Audio Zone

PC/LCD/Plasma/Projector

start
Play DVD
Online Spotlight
My Videos
My Pictures
My TV
My Music
Radio

CCTV

Wi-Fi zone

What is the HomeGrid Forum?

WHAT IS HOMEGRID FORUM ?

HomeGrid Forum (HGF) is an industry alliance that started in 2008 and the first HGF certified product was deployed in 2013. HGF brings together the world's best in technology innovators, silicon vendors, system manufacturers and service providers to promote G.hn, the globally recognized gigabit home networking technology based on ITU-T standards. G.hn, Gigabit home network, provides a single service delivery platform for your entertainment, your workspace – all your digital lifestyle needs – across any wire, simply and reliably.

WHAT IS G.hn?
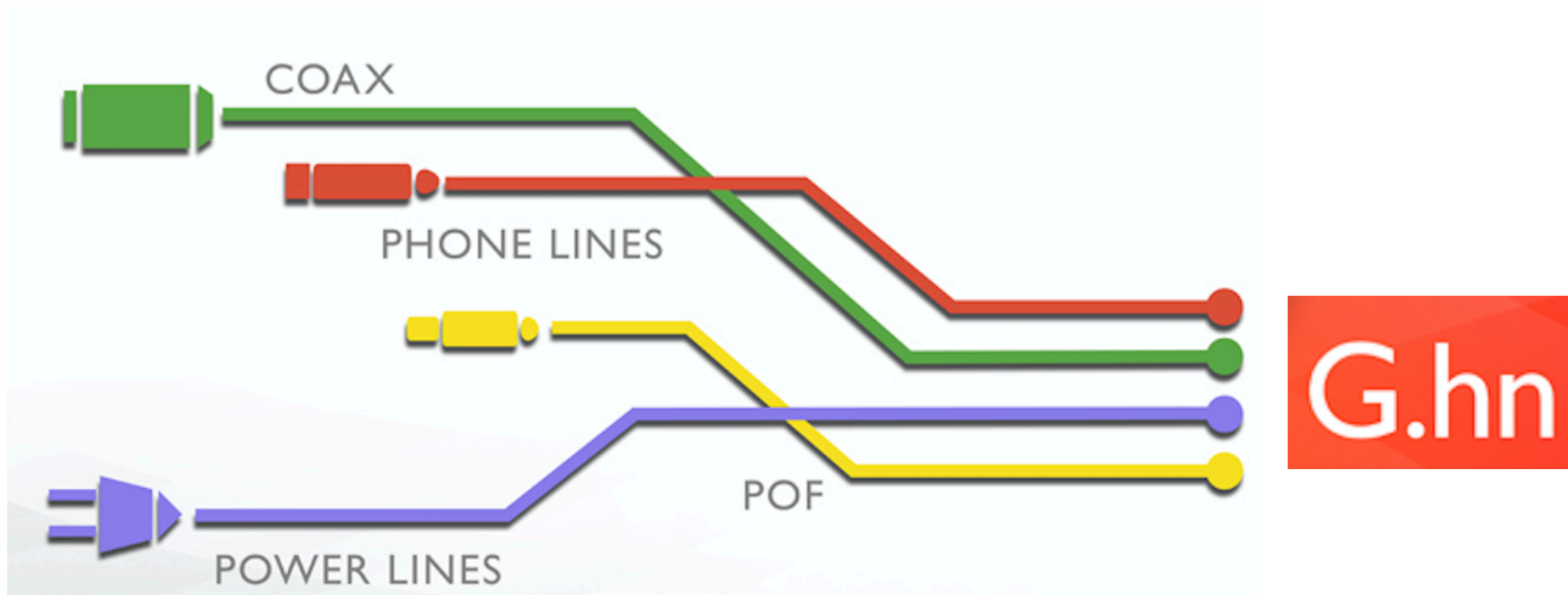
G.hn is one chipset that supports multi wired home networking:
Power line, Coax, Phone line and POF (Plastic Optical Fiber).

What makes a Great Backbone?

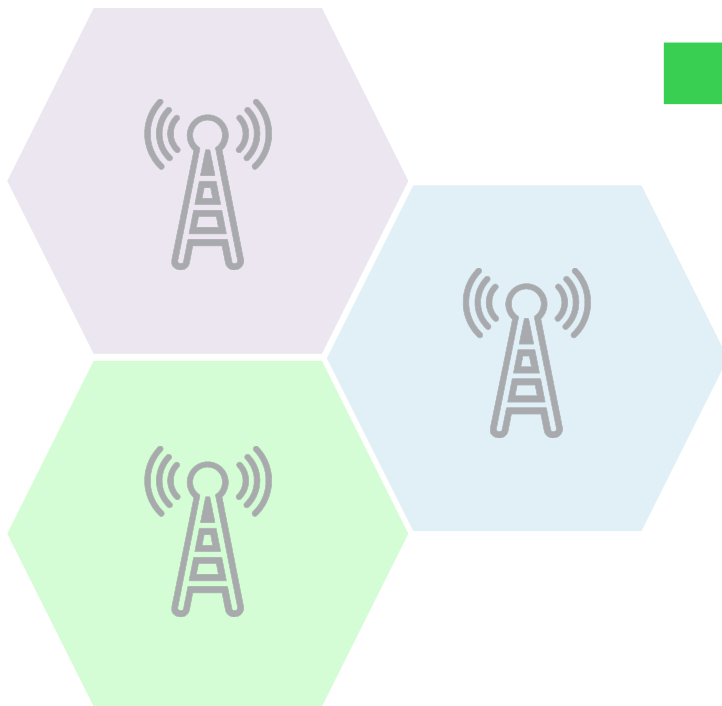# WHAT MAKES A GREAT BACKBONE?

✓ **Security**

✓ **No Interference**

✓ **Highest Performance**
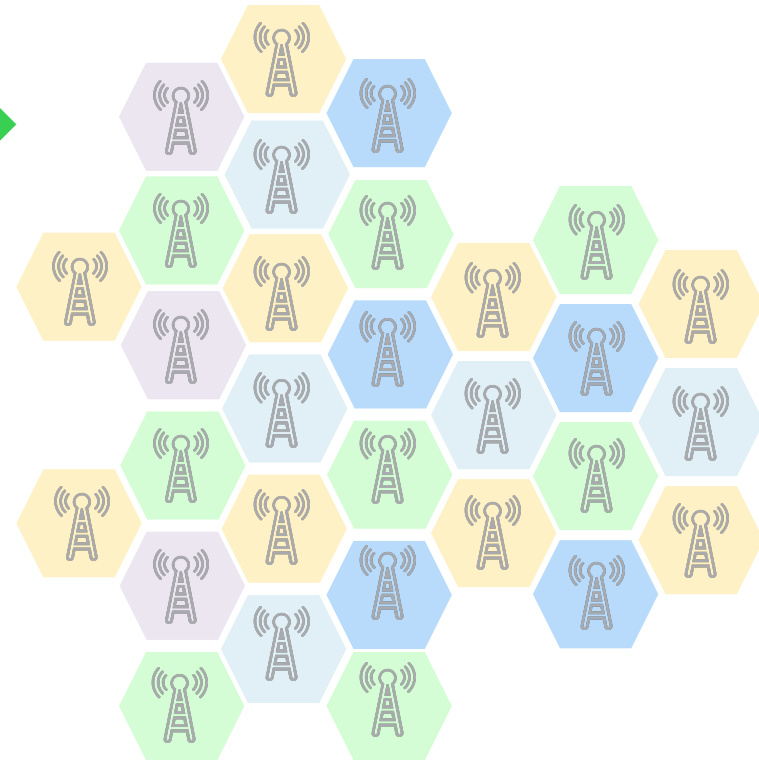
The Best Backbones avoid Wireless "Dead Spots" in a Home

Cellular Networks Methodology

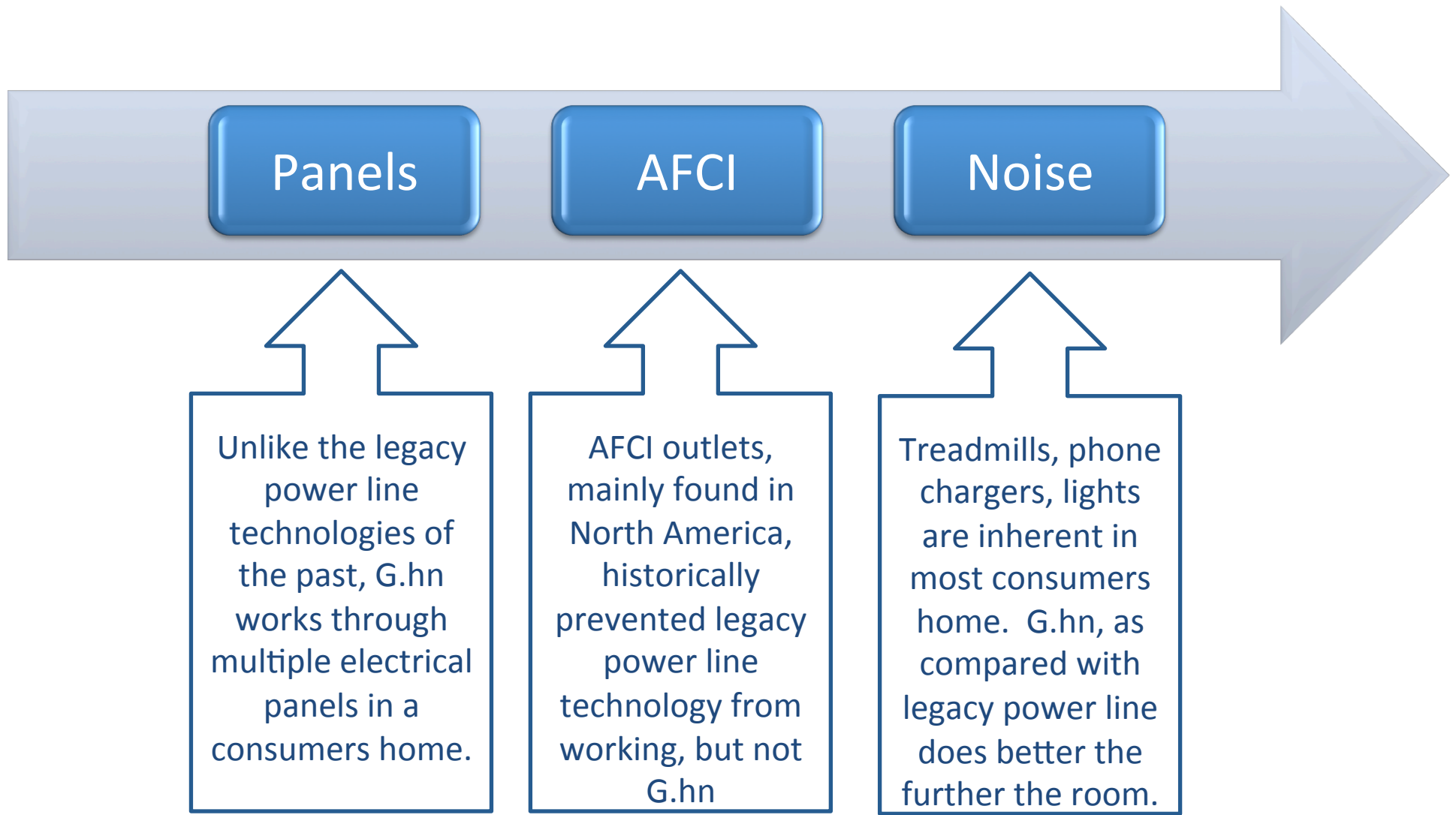Increasing network capacity by reducing cell size

A few high-power macro-cells

Multiple low-power micro-cells

Powerline to Wireless vs. Wireless to Wireless as a Backbone

The New Power line: G.hn

Panels → AFCI → Noise

Panels: Unlike the legacy power line technologies of the past, G.hn works through multiple electrical panels in a consumers home.

AFCI: AFCI outlets, mainly found in North America, historically prevented legacy power line technology from working, but not G.hn

Noise: Treadmills, phone chargers, lights are inherent in most consumers home. G.hn, as compared with legacy power line does better the further the room.

Security

"Per-Link" encryption reduces security threats

G.hn backbone

Key X
Key Y
Key Z

Legacy Powerline

Key X
Key X
Key X
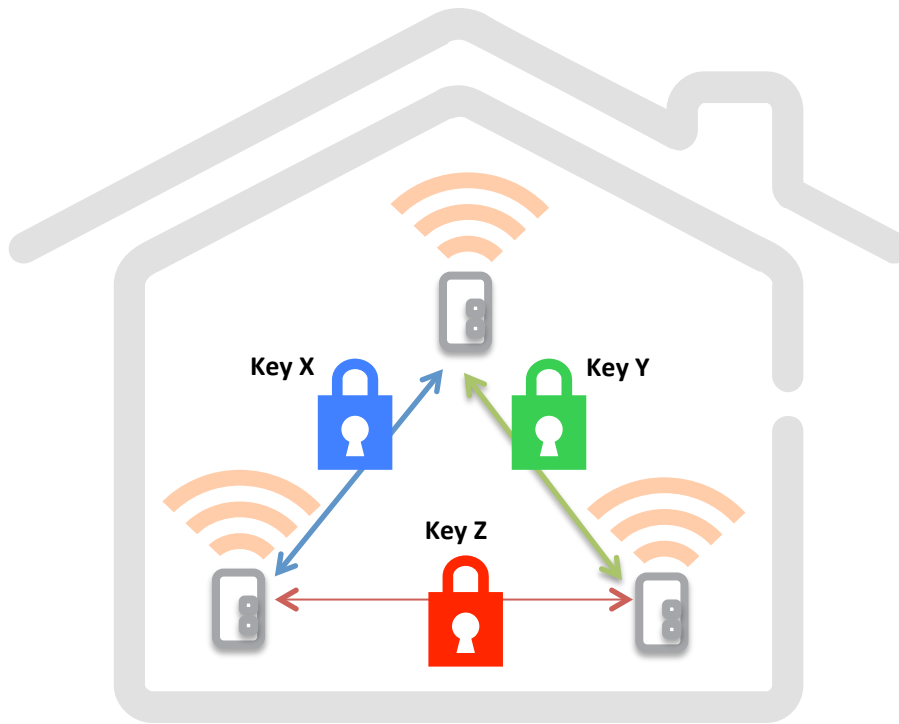
☑ AES-128 encryption
☑ Each link uses a different key
☑ One compromised device "cannot" spy on others
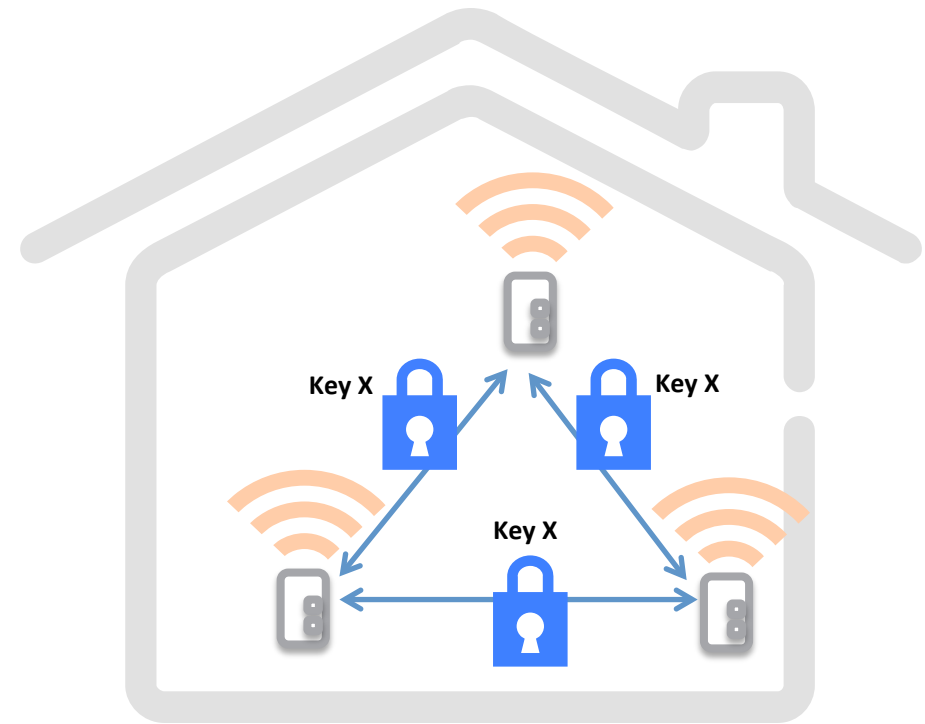
☑ AES-128 encryption
☒ All links use the same encryption key
☒ One compromised device "can" spy on others

G.hn Security

G.hn backbone to Wireless

G.hn over Power line is a secure means to provide the aggregated SSID passwords in a per link encryption network back to the router versus having it exposed on a multiple array of Wi-Fi hotspots where one hotspot compromises all.

✓ **No Interference**

Scenario: "High Power Wi-Fi Access Point"

Potential interference between homes, due to high power transmission

Wi-Fi (channel A)
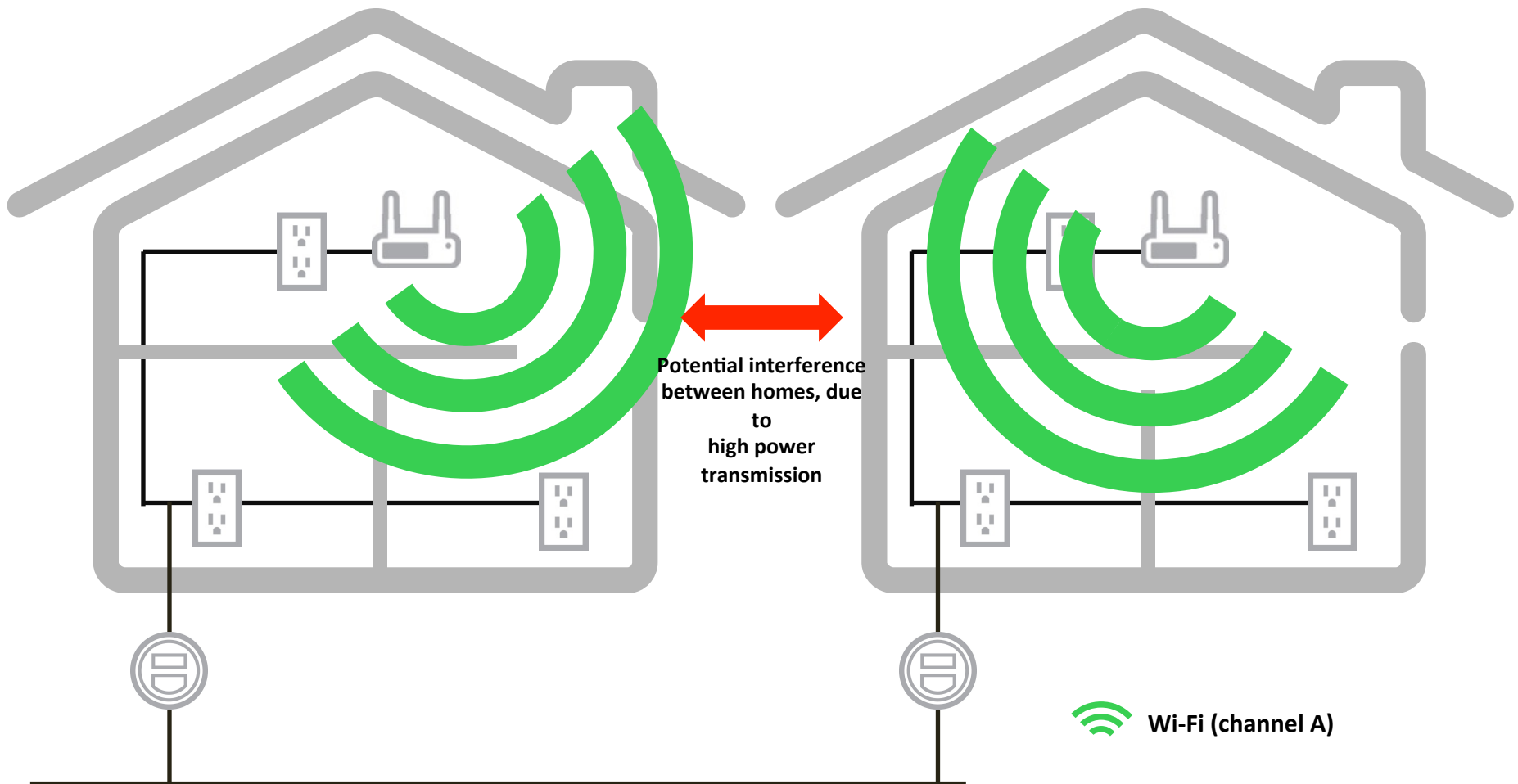
Legacy Powerline as a Wired Backbone

"Neighbor Interference"
from legacy powerline networks

Wi-Fi (channel A)

Wi-Fi (channel B)

Wi-Fi (channel C)

Legacy Powerline (all in same "collision domain")
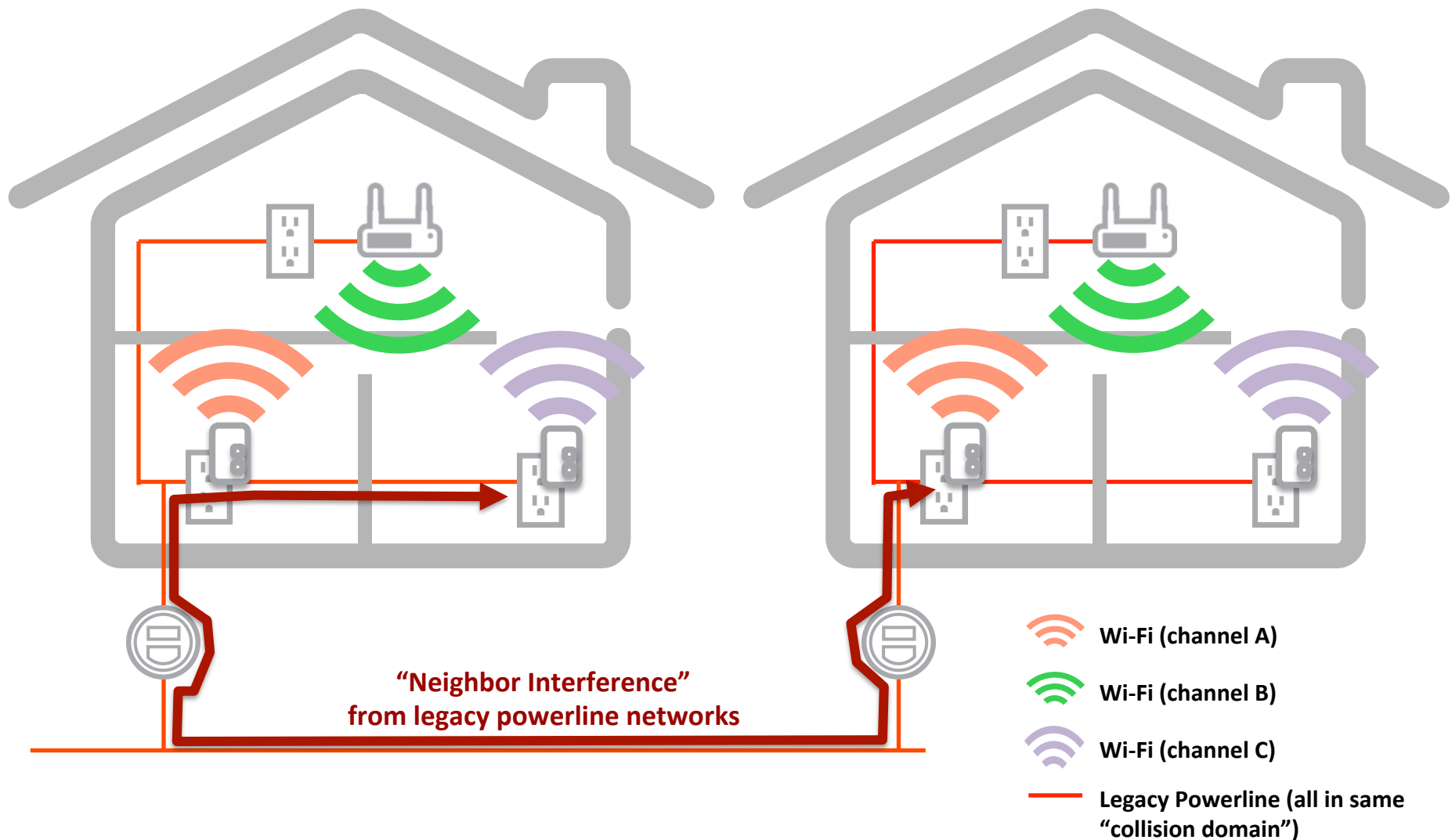
G.hn over Powerline has "Neighbor Protection"

No interference between homes!

G.hn (NDIM code 1)

G.hn (NDIM code 2)

Wi-Fi (channel A)

Wi-Fi (channel B)

Wi-Fi (channel C)
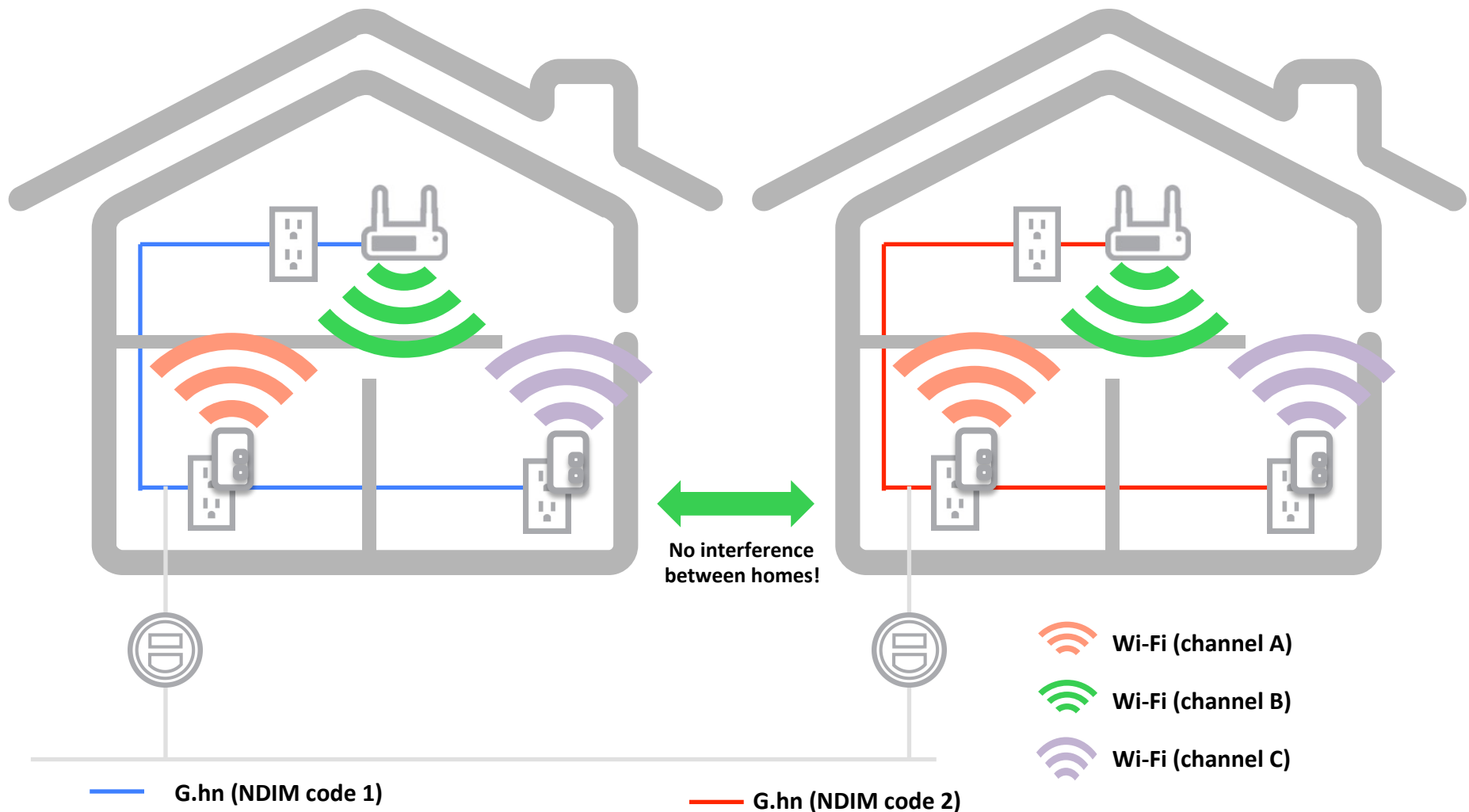
Highest Performance

Why do they disappoint?: Wi-Fi to Wi-Fi

Wi-Fi to Wi-Fi extenders:

Main AP
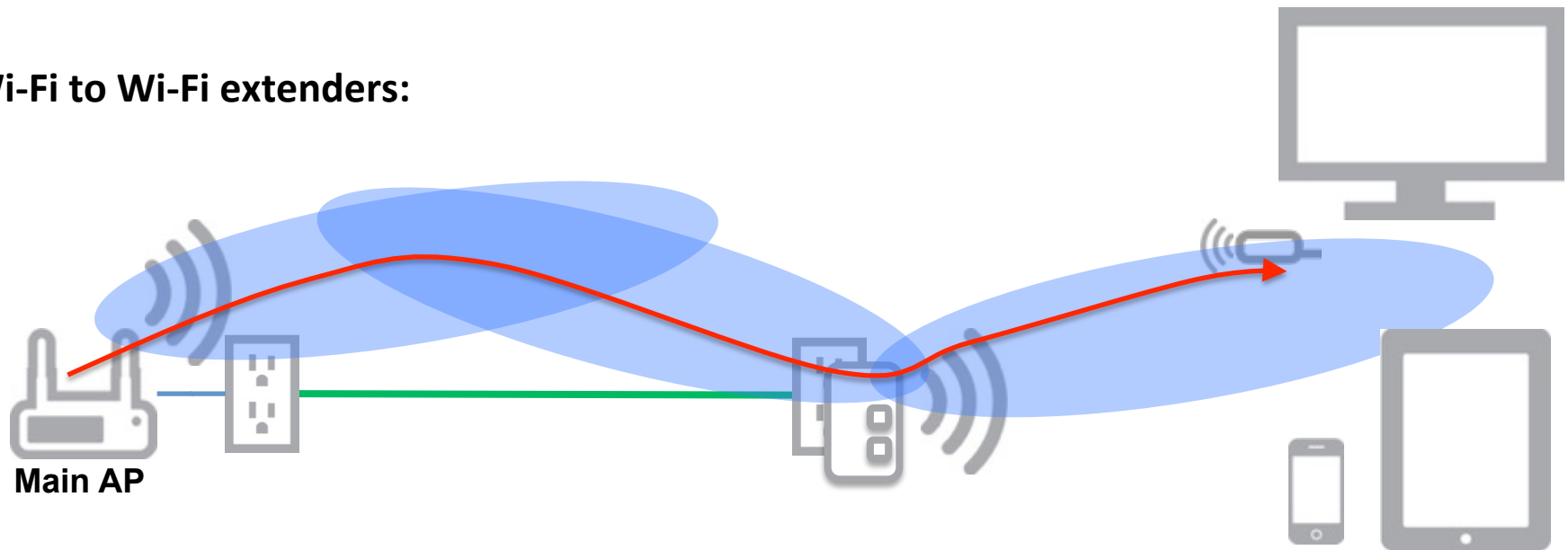
Wi-Fi radio in extender switches is constantly switching between client mode and AP mode effectively cutting bandwidth in half.

Wired Backbone to Wireless

Wired-to-WiFi extenders:

Main AP

Powerline or Coax
(G.hn)

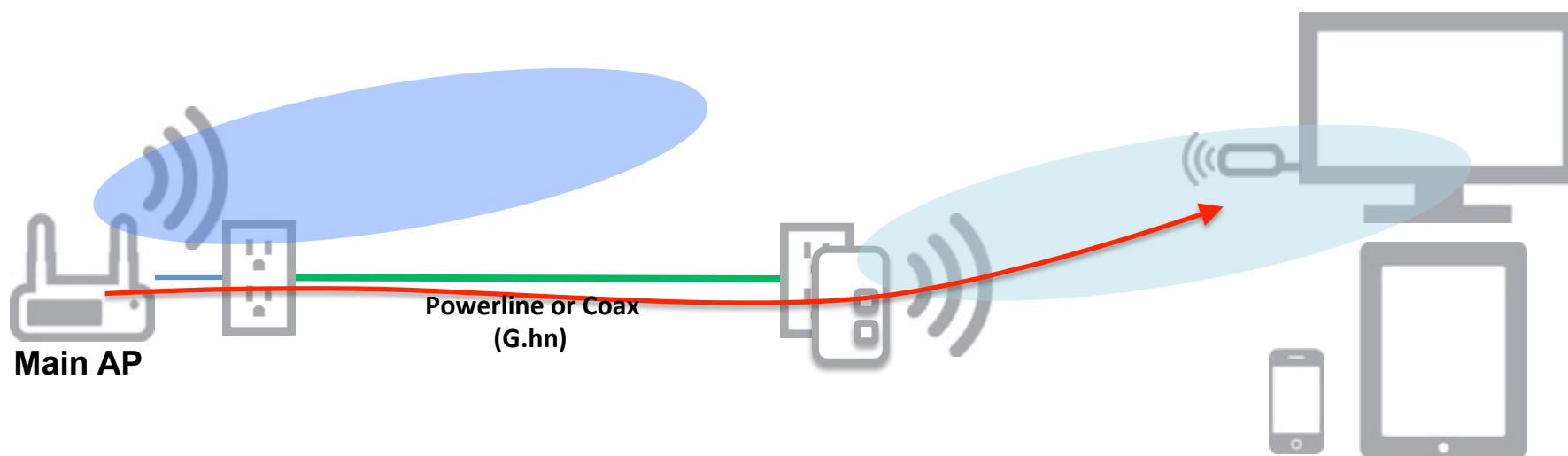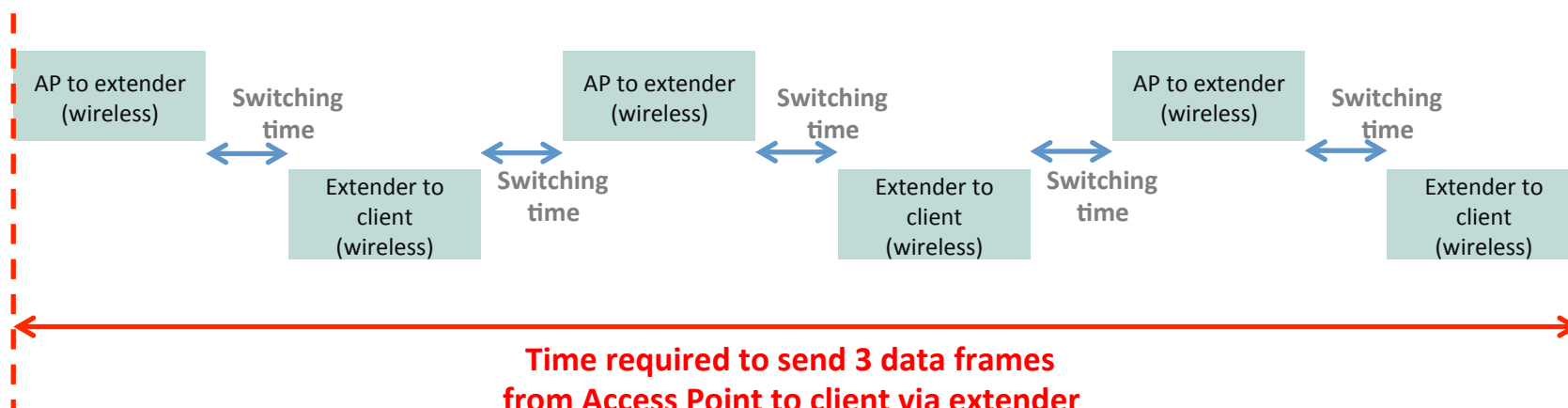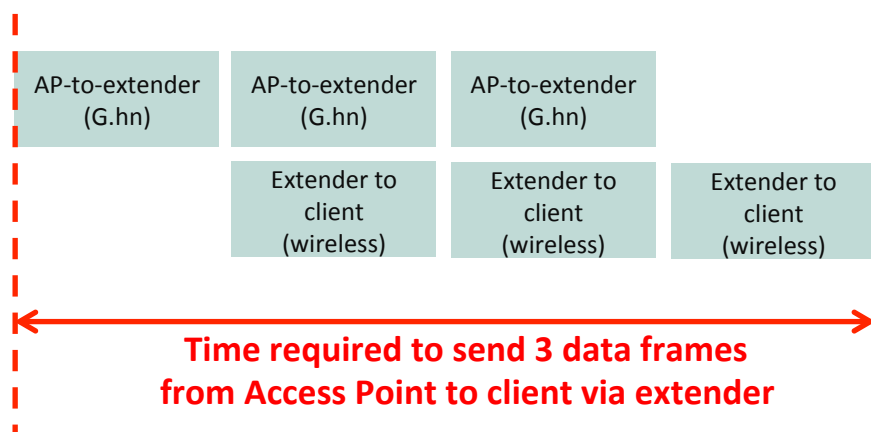# Wi-Fi radio in an extender is in AP mode 100% of the time and can be in different channels

Wi-Fi to Wi-Fi: Cut's Bandwidth in Half

Wi-Fi to Wi-Fi extender, with single transceiver switching between AP and Client mode

AP to extender (wireless)	Switching time
	Extender to client (wireless) — Switching time
AP to extender (wireless)	Switching time
	Extender to client (wireless) — Switching time
AP to extender (wireless)	Switching time
	Extender to client (wireless)

Time required to send 3 data frames from Access Point to client via extender

G.hn to Wi-Fi extender, with dedicated transceiver and no switching

AP-to-extender (G.hn)	AP-to-extender (G.hn)	AP-to-extender (G.hn)
	Extender to client (wireless)	Extender to client (wireless) — Extender to client (wireless)

Time required to send 3 data frames from Access Point to client via extender

Extender type	Throughput	Latency	QoS
WiFi-to-WiFi extender	<50% wireless capacity	>2x latency and jitter	Not suitable for IPTV delivery
G.hn-to-WiFi extender	100% wireless capacity	Normal latency and jitter	Perfect for IPTV delivery

Latency: delay in a network

Legacy Powerline "CSMA" (up to 90ms) and Wireless (20-30 ms)

G.hn has the least latency

G.hn "TDMA" (1ms)

G.hn Backbone

- ✓ **Security**
- ✓ **No Interference**
- ✓ **Highest Performance**