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Overview

Video Everywhere

*MoCA Technology, Making Money, Providing Value in Retrofit Video and Connected TV Installs*

Ask yourself one question – are you providing customers with a high performance and highly reliable solution for HD (high definition) IP (Internet Protocol) video streaming and connected TVs? If not, you might just lose a customer in the not so distant future.

Why? Customers may be saving money going to a local beach instead of a resort, but they aren’t cancelling Pay TV subscriptions or broadband access. In fact, according to recent reports, the trend signifies more connected TVs, more IP video streaming, more Ethernet to TV and more app-based services.¹

What does this mean for you? Pay TV subscriptions give your customers access to content, information and entertainment anywhere, anytime. When they turn to you, these customers expect reliable, high-speed, high-bandwidth access to all their entertainment and video with an even better quality of service.

A home’s video and network plant is now a hybrid of technologies delivering multiple media content. The unifying protocol for this content is IP. While dropped packets and slower access is tolerated for voice and data, customers want their IP video streaming experience to be fast, reliable, secure, and seamless. The retrofit wire of preference for that experience is coax.

Multimedia over Coax Alliance (MoCA) technology is IP over coax. This IP-based technology and standard offers your customers reliable, high-speed, full-bandwidth, quality access to HD IP video streams, Ethernet to TV, OTT (Over The Top) content such as NetFlix® or Hulu™ and home surveillance. It lets you tap into the existing coaxial infrastructure available in 98 million U.S. retrofit environments.²

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¹ “Internet-Connected TV to Grow 36% by 2016”, In-Stat

² 2010 MoCA Annual Report, page 2
To find out how you can make money in new installs and retrofit while keeping the reliable, high-speed, full-bandwidth quality video experience customers expect, read this four part series presenting why coax and MoCA technology ought to be part of your revenue generation plans. We think you'll find this series informative, useful and maybe even a little entertaining.

- **Part I, “MoCA Technology & Economics, Generating Revenue”** addresses the economic benefits of using MoCA technology.

- **Part II, “Coax is the Best Medium for HD IP Video Streaming”** discusses MoCA technology, products and alternative technologies.

- **Part III, “How MoCA Technology Works,”** describes in greater detail the many aspects and advantages of the technology and provides a how-to installation guide.

- **Part IV, “How to install MoCA Technology,”** gives you the information you need to use the reliability king of video distribution in a home.
New Services, New Revenues
Connected TVs and HD IP video streaming content are going to change the way you make money. Right now, OTT is not a true HD stream. Yet everyone in a household expects the same access to full-bandwidth and high speed. Imagine, once there are multiple streams of IP content being accessed simultaneously and OTT is full HD; you’ve got bandwidth issues and network congestion. Who will get the call when bandwidth slows to a crawl or security is breached? You will. There goes your profit margin along with an unplanned service call.

To ensure a consistent, always-available HD IP video stream, you will need a streaming HD IP-based technology and wire solution that works every time. Wireless, while great for data and voice, isn’t dependable for consistent multiple streams of HD IP video. That’s where MoCA technology steps in. Our expertise and products deliver the reliable, full-bandwidth, high speed, consistent and secure HD IP video streaming and home entertainment networking your customers and you want.

MoCA Certified products can help you succeed, whether it’s hooking up a connected TV to the Internet; setting up a system for accessing OTT with existing TVs; extending Internet services to connected TVs or additional rooms; tucking a drive-in theater into an unused garage bay; creating a state-of-the-art poolside home office, or adding home surveillance. If there is an existing coaxial in-home plant and you want reliability, use MoCA Certified products.

Anything that is IP-based can be part of your revenue stream using existing coaxial wiring. In fact, residential retrofit installers are already using MoCA adapters and in-wall units for HD IP video streaming, OTT, connected TVs and extensions of existing Internet. It’s retrofit done right.

Revenue generation using existing coax
Let’s look at the numbers. Normally, you plan on spending two to three hours pulling CAT 5/6 and installing wall plates for each CAT connection. When you add unexpected wall and wiring issues, set-up, clean-up and compliance with Lead Renovation, Repair and Painting (LRRP) rules; it’s easy to understand why a typical ESC can only pull three to four runs per day.

MoCA adapters and in-wall units overlay a high-speed, reliable quality bandwidth pipeline onto an existing coaxial cable plant. These products require a fraction of the time your crew needs to pull, patch and paint a traditional CAT job. They also reduce time spent on LRRP3. Retrofit and smaller jobs are now practical and profitable.

MoCA technology and products can triple the revenue you and your crew can generate per hour (see charts below). This lets you to do more jobs and have more billable hours since smaller jobs now become “filler” at the beginning or the end of a day.

Here’s how the numbers stack up for a typical project 4:

<table>
<thead>
<tr>
<th>ETH Install</th>
<th>Labor Cost (@$50/hr)</th>
<th>Wholesale Material Cost</th>
<th>Total Job Cost</th>
<th>Customer Charge (@ $100/hr labor)</th>
<th>Gross Profit ($/hour)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAT run</td>
<td>3 hrs ($150)</td>
<td>$25 (cable + hardware)</td>
<td>$175</td>
<td>$300</td>
<td>$125 ($42/hr)</td>
</tr>
<tr>
<td>1st and 2nd MoCA technology connections</td>
<td>1 hr ($50)</td>
<td>$75 (2 MoCA adapters)</td>
<td>$125</td>
<td>$300</td>
<td>$175 ($175/hr)</td>
</tr>
</tbody>
</table>

Suppose a customer wants your help upgrading his home theater with a connected TV or accessing streaming HD IP video content or movies currently stored on a hard drive in the home office. He also wants additional Ethernet ports in the den, home office, patio and one in a bedroom. His current Wi-Fi® signal isn’t capable of providing a reliable quality signal or seamless HD IP video.

Using the same rates as before 5, here’s a breakdown of potential revenue for this job:

<table>
<thead>
<tr>
<th>4 CAT Installs</th>
<th>Labor Costs (@$50/hr)</th>
<th>Material Costs (Wholesale)</th>
<th>Total Job Cost</th>
<th>Customer Charge (@ $100/hr labor)</th>
<th>Gross Profit ($/hour)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 CAT runs</td>
<td>12 hrs ($600)</td>
<td>$100 (wire + hardware)</td>
<td>$700</td>
<td>$1400</td>
<td>$700 ($58/hr)</td>
</tr>
<tr>
<td>4 MoCA technology connections</td>
<td>4 hr ($200)</td>
<td>$187.50 (5 MoCA adapters)</td>
<td>$387.50</td>
<td>$1200</td>
<td>$812 ($203/hr)</td>
</tr>
</tbody>
</table>

The more you use MoCA technology and products; the more money you will make.

Retrofit in Commercial Settings:
Adapters can be used in bars, night clubs, hotels or any venue that entertains guests with big screen TVs. For instance, overlaying a club’s video circuit with MoCA technology allows VJs to provide a reliable video network for streaming HD IP video and OTT to any Internet or CAT-enabled HDTV. You can also use the same infrastructure to drop connections for trivia games and other popular bar-top digital entertainment gear.

Next Up
In Part II, “Coax is the best medium for streaming HD IP video” we’ll share why coax is the best medium for streaming HD IP video and whole home connectivity to every stationary CE device.

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4, 5. Labor rates, wholesale material costs and customer charges are based on interviews with custom installers using MoCA. Interviews conducted June 2011 in New York, Philadelphia and Pittsburgh markets.
Part II: Coax is the Best Medium for HD IP Video Streaming

Coaxial cable already exists in more than 90 percent of U.S. households. It is understood by service providers and consumer alike that *coax is for video!*

Why Coax

Unlike other technologies used primarily for voice and data services, coax has been used as the best medium for delivery of video for more than 50 years.

Coaxial cable is has inherent benefits including that it is a shielded wire, meaning that the signal being carried is not subject to interference from outside sources. Because coax is designed to carry TV signals, coax outlets have historically been placed in close proximity to a consumer’s desired TV viewing locations such as the living room, family room or bedroom.

Unlike wireless networks which require sophisticated encryption schemes and lengthy setup, MoCA technology encrypts the signals automatically. MoCA Certified products transmit signals over a shielded cable; therefore you can be assured that your customer’s data, personal information and digital media are safe from interference and theft. By combining shielded wiring, easy isolation from neighbors and automatically enabled security protocols, the MoCA home and entertainment networking technology is designed to be a safe and secure component of hybrid home networks. (*See Figure 1 on next page.*)

Transmitting signals over coax allows MoCA Certified products and technology to operate at much higher speeds than other technologies such as wireless or powerline which are prone to interference. Wireless networks predominantly operate in the same frequency spectrum as cordless handsets, microwaves and other wireless devices.

When it comes to video, reliability is king. The high bandwidth and reliability of MoCA technology makes it the ultimate choice to deliver multiple IP and HD multimedia streams. This technology turns a building’s existing coaxial cable infrastructure into a dual-channel conduit delivering HD IP video content and high-capacity Ethernet connectivity to every coaxial connection in the house. MoCA technology does this by using part of the cable’s bandwidth that’s not occupied by CATV or satellite video bands. This coax segment becomes the pipeline for the HD IP data and other IP data that would normally require a separate Ethernet cable run.
MoCA Technology and the Installer

Using MoCA technology, wiring a home or business for IP video streaming and Ethernet is now just a matter of installing a MoCA Certified router between the Internet modem, then adding a MoCA adapter or in-wall unit wherever a connection is needed and coax is available. Need to add an Ethernet port to a patio, kitchen, garage or public area? No problem. The technology and products provide an easy extension of a Wi-Fi access point for robust localized wireless coverage throughout even the largest home or commercial space simply by employing existing coaxial cabling.

Any interruption to the bandwidth means a phone call to you from an unhappy customer. We suggest that you focus on reliable delivery with MoCA technology for HDTVs, game consoles, Blu-Ray players, NAS boxes and other stationary devices with an ETH port than can be connected to a TV. Let Wi-Fi technology connect everything else.

Once installed, MoCA technology also gives you with an open, versatile framework that can be easily upgraded to meet your customers' future needs. Re-using a home or building’s existing hard-wired cable infrastructure with MoCA Certified products makes a network range flexible. MoCA technology also keeps the network resilient to interference and security issues which can affect Wi-Fi systems.

Many Alternatives - Only One Solution for Video

Face it, homes and offices are a hybrid networking environment. This blended networking environment exists because it’s either impractical or impossible for existing CAT 5/6 Ethernet cable plant to reach every drop point as well as the inherent limitations of wireless and powerline for video.
While other technologies focus on mobility (wireless) or ubiquity (powerline), MoCA technology is specifically created to support the high bandwidth, low latency characteristics of HD video. With video, there is no compromise. MoCA Certified products provide you with the HD IP-based video streaming technology that gives you reliability, low latency and the ability to sleep through the night with fewer customer calls.

The following table and brief descriptions below summarizes the strengths and trade-offs offered by today’s commonly-used networking technologies:

<table>
<thead>
<tr>
<th>Technology</th>
<th>Value Proposition</th>
<th>Drawbacks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wireless (Wi-Fi)</td>
<td>Mobility</td>
<td>Reliability is a challenge</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Prone to interference</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unlicensed band</td>
</tr>
<tr>
<td>Powerline</td>
<td>Ubiquity of outlets</td>
<td>Performance not on par with MoCA technology</td>
</tr>
<tr>
<td>(HomePlug, HDPLC, UPA)</td>
<td></td>
<td>Prone to high interference</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Low outlet coverage performance</td>
</tr>
<tr>
<td>Phoneline (HomePNA)</td>
<td>Ubiquity of phone jacks</td>
<td>Performance can not match MoCA technology</td>
</tr>
<tr>
<td></td>
<td>Also works over coax</td>
<td>Does not work in cable modem environment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No endorsement by US satellite providers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Technology deadends. No HPNA 4.0.</td>
</tr>
<tr>
<td>Coax (MoCA)</td>
<td>Proven performance and Reliability</td>
<td>Reliant on coax outlet penetration</td>
</tr>
<tr>
<td></td>
<td>In use by all three pay TV segments</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MoCA 2.0 ratified</td>
<td></td>
</tr>
</tbody>
</table>

**MoCA Technology – The Choice for Reliability**

The full-bandwidth pipe and reliability of MoCA technology makes it the choice to deliver multiple IP and HD multimedia streams around a home without interruption or interference. Its robust modulation scheme and low-latency protocols unlock the unused bandwidth in a home’s or building’s already installed coaxial cabling, allowing you and the MoCA standard to deliver a rich “quality of experience” without the cost and disruption involved in pulling new Ethernet cabling.

**What does it mean?**

As we have briefly described, there are other well established technologies for home connectivity, but not all are created equal and not all are equally appropriate for every application. It’s up to you to determine the underlying and unassailable requirement for your client’s needs/wants/desires and then choose the correct medium and corresponding technology standard.

*Just remember, when it comes to HD IP video streaming: MoCA technology is the king of reliability.*

**Stay tuned**

In the following section, we’ll talk a about the science of MoCA technology.
Part III: How MoCA Technology Works

Now we’re going to get geeky with a technical overview on how MoCA technology can do what it does.

MoCA is IP over coax

With MoCA, a single HD IP video stream can be broadcast to multiple locations on the network with the only additional overhead of an extra 1Mbps control channel per destination. This means that MoCA technology can support 2, 3, or even 4 HD IP video streams while still having enough reserve capacity to deliver lightning-fast Internet access and support other IP-based traffic.

The technology standard creates a separate channel for IP data within the home’s or building’s existing coax wire plant by operating at frequencies that lie above the 50-806 MHz band typically used for off-air and CATV/IPTV programming. A MoCA 1.0 or MoCA 1.1 channel occupies 50 MHz and uses adaptive constellation multi-tone (ACMT) modulation (similar to the techniques used by ADSL, DOCSIS, and other broadband technologies) to achieve usable data rates in excess of 150 Mbps.

![MoCA Spectrum Allocation Diagram](image)

A 50 MHz MoCA 1.0 or MoCA 1.1 channel can be located in any one of the designated frequency bands in the 850–1650 MHz spectrum, allowing it to peacefully co-exist with frequencies occupied by standard CATV and DBS satellite services as well as the expanded IPTV services which occupy up to 860 MHz. (See Figure 2)

Table 1 depicts the four operating bands which have been defined by the MoCA 1.1 standard to insure compatibility with the frequency plan of virtually any terrestrial network operator. The MoCA 1.1 standard also specifies the L&PSK band which is used for satellite systems. In all cases, only one channel per band is used on a physical network, although multiple networks may be formed over the same coaxial cable plant using different bands.
Table 1 – MoCA operating bands insure co-existence with CATV, IPTV, and DBS services.

As shown in Table 1, bands A, B, C and E are reserved for use by the network operator. D band is unique because it allows the use of both most operators’ customer premises equipment (CPE) along with MoCA adapters and in-wall units. With few exceptions, the MoCA Certified products that you’ll be working with will be configured to operate in the D band.

Regardless of which band it uses, a MoCA technology data channel can support up to 16 locations. This can be any combination of MoCA Certified products such as set top boxes (STB), routers, or adapters and in-wall units (See Figure 3). Once installed, the locations form a full-mesh, peer-to-peer network where every device can communicate directly with any other location on the network. In most systems, one location device (typically a STB or router) is designated as the network controller (NC). The NC’s role is to act as a “traffic cop”, enforcing the time-slotted media access control (MAC) protocol which divides the channel’s available bandwidth into individual data streams that carry voice, video and data between locations.

<table>
<thead>
<tr>
<th></th>
<th>Center Frequency</th>
<th>Channel Step</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>875 MHz</td>
<td>-</td>
<td>Operator Only (DBS)</td>
</tr>
<tr>
<td>B</td>
<td>900 MHz</td>
<td>-</td>
<td>Operator Only (DBS)</td>
</tr>
<tr>
<td>C</td>
<td>925 - 1000 MHz</td>
<td>25 MHz</td>
<td>Operator Only (MSO, Telco)</td>
</tr>
<tr>
<td>D</td>
<td>1150 - 1500 MHz</td>
<td>50 MHz</td>
<td>Operator/Installer/Retail (Cable, VZ)</td>
</tr>
<tr>
<td>E</td>
<td>500 - 600 MHz</td>
<td>25 MHz</td>
<td>Operator only (DirecTV, DBS)</td>
</tr>
</tbody>
</table>

Figure 3 – MoCA in a CATV environment

6 Cox Communications, as of June 2011, does not permit co-habitation on the network.
The MAC uses intelligent priority control and quality-of-service (QoS) mechanisms which ensure that IP voice and video streams are allocated the bandwidth they need and that their packets are routed ahead of lower-priority traffic to avoid audio dropouts and lost video frames. The MAC layer also has mechanism that protects access to the network and information exchanged between connected nodes using key-based authentication and encryption. All media streams between nodes are encrypted using the 56-bit DES standard.

A MoCA adapter or in-wall unit splits the Ethernet stream from the cable plant’s video signals and delivers them to separate RJ-45 and coax output connectors. Regardless of whether you plug in an external adapter or mount an in-wall unit, installation rarely requires cutting any new holes and few, if any, tools are involved. (See Figure 4)

![MoCA router, adapters and In-wall unit](image)

*Figure 4 – MoCA router, adapters and In-wall unit*
*Photos courtesy of Actiontec, Channel Master, Wi3 Inc.*

**MoCA Basics**

MoCA technology operates over the hierarchical (branching tree) physical topology of the coaxial cable plants found in homes and commercial buildings. The technology’s root is the first passive splitter connected to the service provider’s drop cable, satellite receiver, or optical network terminal (ONT). For networks which are connected to a CATV or MSO coaxial cable system, a point of entry filter is used. Branches flow from secondary splitters and outlets in the home. The maximum coaxial cable distance supported between the root and the last outlet is 300 feet and the maximum attenuation permitted is 25 dB.
Figure 5 – MoCA Tree-and-Branch Network Topology

In order to support peer-to-peer data connections, MoCA technology uses a technique called “splitter jumping” to create a logical, fully meshed point-to-point network. By taking advantage of the cross-talk between the splitter’s taps, each of the nodes establishes a bi-directional connection with all other nodes. Figure 5 illustrates how this technique creates a logical meshed network that allows for streaming of IP video content to any room in the house. Likewise, the router uses this meshed topology to support Ethernet connections for computers and IP-enabled home entertainment products anywhere a coax connection is available. Remember, MoCA technology is IP over coax and the king of video reliability.

We think it should be noted that MoCA technology is the only home networking standard to publish results of field trials which ensure interoperability between devices. MoCA technology also provides actual MAC (media access controller) streaming rates. It’s vitally important to understand true and accurate MAC rates for home entertainment network configuration.

Services supported by MoCA technology
Ratified in 2005, the MoCA 1.0 standard supports 110 Mbps net throughput (MAC) worth of streaming IP data on a single 50 MHz channel. This was superseded in 2007 by the MoCA 1.1 specification which delivers actual MAC speeds of up to 175 Mbps and is supported by virtually all equipment being sold today. A full-resolution MPEG2 video stream requires 21 Mbps (20Mbps for video + 1Mbps for a control channel) while even the highest-definition audio streams require less than 1 Mbps.
The MoCA MAC protocol contains provisions for breaking the channel’s available bandwidth into individual HD IP video streams which are broadcast from a STB, router or other transmitting device across the network to one or more receiving devices. These general-purpose HD IP video streams can be used to support a broad variety of services including:

**Multi-room/Personal Content Sharing** – MoCA technology lets your customers share licensed content from virtually any piece of personal electronics gear with any compatible playback device on the network. In addition, they can share the pictures, music and videos that they create or store on a networked storage device.

**Ethernet Over Coax/Ethernet to TV** – Homeowners can now enjoy the speed and security of a hard-wired Ethernet connection without the cost of running new wires. In addition to home offices, MoCA Certified products allow the owners of commercial and high-density multi-tenant buildings to give their customers Internet access with high capacity and quality of service that a wireless connection cannot match.

**Making Wi-Fi Better** – Using MoCA technology to add an Ethernet-connected Wi-Fi access point to a patio, kitchen or public area makes it easy to deploy robust localized wireless coverage throughout even the largest home or commercial space.

**Multi-Room Gaming** – By making it easy to put an Ethernet port in nearly any room, MoCA technology allows a home network to support distributed multi-player environments. The lower latency and higher data capacities afforded by hard-wired MoCA adapters provide a superior gaming experience that a wireless connection cannot match.

MoCA technology is incorporated in the technical guidelines established by the Digital Living Network Alliance (DLNA®). DLNA protocol enables secure streaming of multimedia content between home entertainment and mobile devices. Using the DLNA app on a MoCA enabled network, a mobile app such as an iPad can access a customer’s stored video and personal IP based content.

**Get ready to install**
Now that you understand the technology behind the standard, time to install.
Part IV: How to install MoCA technology

You’ve read how MoCA technology does what it does, it’s time to put MoCA to work for your customers and make some revenue.

While MoCA technology can’t solve every problem you encounter, it is a versatile part of your toolbox. Thanks to its robust electrical characteristics, the technology is reliable, fast and saves your crew install time. By paying attention to a few simple guidelines, you’ll make best use of its capabilities and avoid potential problems.

Step 1: Assess the Customer Site

It’s important to get a good picture of the coax network that’s in your customers’ walls. This usually adds only a few minutes to the install. It can help you identify and eliminate most potential problems before they have chance to wreak havoc on your schedule.

Sizing up a cable plant includes looking for non-standard topologies, identifying substandard components and keeping a sharp eye out for any shoddy work done by someone else including your customer.

Step 2: Determine if the building’s cable plant is MoCA technology ready

MoCA technology works under a wide range of line conditions. It uses “splitter jumping” capabilities which enable its 2-way communication. This requires the cable plant to have only a single layer of branch splitters beyond the so-called root splitter (See Figure 6 above). For the same reason, any conventional one-way line amplifiers must be located above the root splitter.
Keep in mind these requirements:

- Maximum cable distance supported between the root and the last outlet is 300 feet (60 meters).
- Maximum attenuation permitted is 25 dB.
- Single layer of branch splitters beyond the root splitter.
- See the checklist at the end of this section for more information on assessing MoCA technology ready cable plant.

Step 3: Correct any problems your inspection revealed and test the network to verify it’s MoCA technology ready.

Eliminate any cascaded splitters, get rid of open splitter taps, replace old splitters.

Your wire plant clean-up begins with getting rid of any cascaded or multi-tier splitter connections. Splitters with unused taps can unnecessarily reduce signal strength throughout your network. Replace them with qualified components that have the right number of ports.

This is also a good time to replace any older splitters you’ve found which might have a hard time passing HD video signals or have poor cross-port characteristics. In fact, many seasoned ESCs have found it’s a good practice to replace any splitters that are even slightly questionable at the start of a job to reduce the chances of having problems later.

Make sure your cable runs are within MoCA technology length limits.

The 300-foot (60 meter) maximum reach of MoCA technology is generally not a problem except in larger houses or cases where you’re trying to connect a pool house, detached garage or some other remote out building. Installers who work with larger buildings often segment service by wings to keep cable runs within the 300-foot length. Connections to a distant outbuilding can be accomplished by running an Ethernet cable from the main building’s router and then using a MoCA adapter to put the signal back into the outbuilding’s cable system.

Make sure there are no line amps located downstream of the drop.

Conventional line amps don’t support the 2-way MoCA signals so they must be eliminated from any part of the cable infrastructure that will be carrying IP traffic. If a line amp is required, placing it between the drop point and the input of the root splitter is permitted. For installations that do require a downstream booster, some ESCs will locate the modem at the head of the chain and create isolated video-only links that need amplifiers on a separate leg.
Step 4: Install the adapters/in-wall units and any other MoCA compatible devices

Insert a Point of Entry filter between the drop and the root splitter.
The point of entry (PoE) filter does double duty blocking your clients’ IP signals from exiting the home cable plant and strengthens their in-home signal. Some CI/SI pros also like to use additional PoE filters on the outputs of older VCRs and other legacy equipment that’s attached to building’s cable plant. Doing this is a simple way to block any potential interference they might generate.

Install a MoCA adapter or in-wall MoCA compatible product at the network router and at each location where an Ethernet connection is needed.
This is also the time to attach any other MoCA Certified products to the cable plant. Here are a couple of helpful tips to insure you get the best results:
• Make sure that the Adapter’s power supply is connected to a wall outlet or another AC source.
• Make sure the coax connection are attached to the Adapter’s “cable in” port. The “cable out” port has a filter that blocks the IP signal and is intended to feed a TV or other device that only requires video signals.
• If you’re sharing the cable plant with a satellite operator (i.e. DirecTV or Dish Network) you’ll need to install specialized Adapter’s that operate at a different frequency. For details, see the note; “Working with Satellite Operators” at the end of this section.

Verify all the MoCA Certified products are powered up and then test each connection to verify Ethernet activity.
Once you’ve ensured all your MoCA Certified products are powered up and connected (including the router), it’s time to check for Ethernet activity at each node you’ve installed. There are several excellent testers on the market which will simplify this task and provide a detailed analysis of the performance of each leg of your network. If you’re just getting started or simply can’t afford an automated tester, you can use an ordinary laptop computer and a standard Ethernet “speed test” program. While a laptop test does not give you the fine-grained diagnostic and analysis capabilities a specialized tester will give you, it is a handy way to verify the presence an Ethernet connection and get a first-order measurement of its capacity.

A note about working with satellite services – Most MoCA Certified products operate the 850-1500 MHz D band located above the operating bands used by cable operators and most other MSOs. For both cable and fiber services, you’ll be using D band certified products (look for the “built for cable” label on the box). These products are widely available from most major distributors serving the ESC community.
Satellite systems have operator-specific requirements and are incompatible with D band cable-ready equipment — or even products designed for other satellite operators. For example, DirecTV’s cable adapters are called DECAs and operate in the E band. DECAs and other E band products are available to installers from selected wholesale distributors or directly from satellite Pay TV providers. In most cases, you will have to work with the satellite services available in your area to obtain compatible equipment.

Special Section: MoCA technology ready cable plant checklist:
Using the following checklist to address these basic issues will go a long way to insuring great first-time results and a minimum of call-backs:

*Assess the network’s current performance.*
Using a MoCA Certified line tester is a quick, easy way to insure that your customer’s cable plant can support high-speed data services. If you don’t have a cable tester, a standard HDTV can serve as a surprisingly useful tool for giving you a quick first-order test of the building’s line conditions. Using any HD signal available on the line (preferably 1080p), verify that the signal delivers a high-quality image in every location you’ll be installing equipment. If practical, verify signal quality at any other outlets as well. If a particular room or group of rooms demonstrates image tiling, noise, dropouts, or other issues, it is likely an indicator of a problem in a particular leg of the wire plant. If there are issues throughout the building, the problem may lie near the root splitter – or with the MSO.

*Get a history of cable plant.*
Learn whatever you can from the building owner about when the cable system was installed and when it was last upgraded. Getting this case history is no substitute for a physical inspection but it can help you plan your installation and provide helpful clues about potential trouble spots.

Knowing the age of the cable plant will give you a good idea of the type of and condition of the cable and splitters you’ll be dealing with. This can be important since MoCA technology and products work just fine even with the higher losses associated with older-style RG-59/U cables, but the aging process associated with connector terminations which can work loose over time, can cause unacceptable losses and reflections.

*Find out how you’ll be sharing the cable.*
Part of your initial survey should also involve asking about what, if any, services are currently running over the coax system. In some cases, there may be two coax plants (often satellite and cable) and getting any information on which service is going where will save you a lot of guesswork later. If there are any services currently running on the coax you’ll be working with, make sure you know the frequency of the video signal. Video signal frequency will dictate what type of equipment you can use.
Find out how you’ll be sharing the cable.
Part of your initial survey should also involve asking about what, if any, services are currently running over the coax system. In some cases, there may be two coax plants (often satellite and cable) and getting any information on which service is going where will save you a lot of guesswork later. If there are any services currently running on the coax you’ll be working with, make sure you know the frequency of the video signal. Video signal frequency will dictate what type of equipment you can use.

Be aware of previous residents.
It’s also helpful to also find out if the coax system was used by any CATV or multi-service operators earlier in its history. In some cases the cable plant may have been used to distribute broadcast TV signals from a local antenna. These are all tip-offs to look for “vestigial” equipment such as line amps or non-standard splitter configurations that could cause trouble for your MoCA Certified products installation.

Do a thorough physical inspection.
Look carefully for ganged splitters, cascaded splitters and line amplifiers that can interfere with the two way communication used by MoCA technology. This is especially true for older, larger buildings which often harbor complicated nests of concatenated splitters that have accumulated as the system grew over the years. If you do encounter an older structure, it’s usually a good idea to look for hidden splitters that may have been installed in odd places over the years on an ad-hoc basis - often by the homeowner, a helpful neighbor, or some other untrained individual. A few minutes spent eliminating these hidden hazards can save lots of troubleshooting later.

You did it!
Now you are up and running with MoCA technology! Congratulations. See it wasn’t that hard now was it?
MoCA: A solid business partner

MoCA technology is IP over coax and the king of reliability. When you include the technology in your business plan, you can be confident that you’ve teamed up with the Multimedia over Coax Alliance (MoCA), an active community of equipment manufacturers, cable, satellite, and IPTV operators, and custom electronics professionals. This broad industry coalition develops, certifies, and promotes interoperable, networked, digital entertainment products based on MoCA technology. With most of the major OEMs and cable operators committed to the MoCA standard, you can be assured that the equipment you install today will remain part of an ever-expanding ecosystem of interoperable products and services for the foreseeable future.

While most installers ESCs, and other mid-sized custom electronics businesses will not be involved as members, Multimedia over Coax Alliance also offers many resources to the user community who puts their products to use. In addition to the many educational seminars at the Consumer Electronics Show (CES) and CEDIA’s numerous conferences, the Alliance web site (www.mocalliance.org) is a treasure trove of information on MoCA technology, MoCA Certified products, and the innovative ways they are being used.

Here’s a sampling of what you can expect to find:

Training & support

MoCA Product Training: Enabling IP Over Existing Coax To Help Grow Your Business – This excellent 3-part series of educational videos will give you a refresher course on what you’ve learned in this white paper and then take you to the next level. In addition to the videos, you’ll also find links that allow you to download the slide sets from each of the tutorials. It’s all available at the Custom Installers area of the MoCA web site’s Resources section: www.mocalliance.org/CEDIA/index.php

Deploying Enhanced Media Services with MoCA Technology – If you need an in-depth look at the benefits and challenges of deploying MoCA technology in home networking environments, be sure to download this excellent paper from the Society of Cable Telecommunication Engineers. It’s located in the Resources section of the MoCA web site: www.mocalliance.org/industry/white_papers/Branded_Implication_Paper_MoCA.pdf

MoCA Certified products and services

MoCA Certified Product Directory – Whether it’s a MoCA Certified Wi-Fi router, a POE filter, or a MoCA Certified adapter, the product directory will help you find it. The directory also provides a list of MoCA Certified equipment manufacturers. Be sure to visit the directory at: www.mocalliance.org/industry/certified_products.php
More resources

The MoCA Blog – This lively blog provides a gathering place for installers and other custom electronics professionals involved with MoCA technology to exchange information, swap tech tips, and keep up with the latest products and practices. It is managed by Jamie Ching of Entropic Networks, a prominent proponent of installers using MoCA technology. In addition to the blog itself, there are lots of educational videos and other MoCA technology related material available for free. Check it out at: http://mocablog.net/

Testing and Deployment: Making MoCA In-Home Networking Easier – An expanded version of the testing practices you need to know when pre-qualifying a building for MoCA technology deployment and for trouble-shooting networks when problems do arise. Download the PDF document at: www.cable360.net/cfp/features360/ct/44237.html

Join MoCA

Membership in the Multimedia over Coax Alliance is open to manufacturers, technology developers, as well as cable, satellite and IPTV operators. In addition to providing ongoing standards development and product certification, the Alliance provides its members with technical and educational, and marketing resources. As a MoCA member, you’ll enjoy many benefits, including:

• Access MoCA technology specific documents, technical materials and specifications.
• Being part of the thought leaders defining home entertainment networking.
• Actively participate in Working Groups that advance the MoCA standard.
• Be eligible for product interoperability certification.
• Increase your presence throughout the industry with MoCA technology marketing, promotions, tradeshows, and events.
• Receive discounted attendance at sponsored workshops and conferences.

For more information on membership in the Alliance, visit: www.mocalliance.org/join/index.php.