

## HOUSE CHECK - A NEW PROCESS TO VERIFY VOICE INSTALLS

Mike Gordish, Product Manager, Mobile Workforce Manager, C-COR

Robert F. Cruickshank III, VP OSS Market Strategy, C-COR

Dan Rice, VP Assurance Solutions, C-COR

### *Abstract*

*As MSOs accelerate efforts to satisfy strong market demand for cable digital voice services they have an opportunity to adopt new installation procedures that can contribute significantly to customer retention while reducing ongoing operational costs. Back office-based 'Assurance' software that delivers comprehensive analysis of voice service performance on the MTA (multimedia Terminal Adapter) across all household cable outlets with DOCSIS equipment installed, allows installers to quickly obtain a view of whole-home service quality that simplifies identification and repair of problems at installation and provides a reference base for use in future trouble shooting. By aggregating and interpreting DOCSIS-generated data on RF signal quality, jitter, packet loss and other parameters, these "house checks" provide easy-to-understand readouts on installer handhelds and give Customer Service Representatives, Dispatchers, Engineers and Network Operations Center (NOC) personnel a reliable record of the true state of performance before the installer leaves the premises.*

### INTRODUCTION

Early market response to IP-based cable digital voice service has prompted MSOs to move as quickly as possible to extend service reach within existing markets and into new markets. At the same time, operators recognize that the faster they proceed, the greater the challenge they face in meeting the fundamental requirement that their voice services match or exceed the performance

quality of incumbent switched circuit telephone service.

Where, initially, operators could afford to devote whatever amount of time it took for well-trained in-house installation personnel to perform comprehensive testing and repairs on drop connections and home wiring to ensure quality performance, the industry is long past the stage where spending several hours per installation is feasible. In order to scale to millions of customers, MSOs have had to reduce installation times while often turning to outside contractors to handle the volume of orders.

This accelerated pace of deployment and service provisioning raises the risk that problems will arise after installers leave, which in turn can lead to higher levels of customer dissatisfaction. One MSO's recent study<sup>i</sup> of the impact of faulty service on customer retention found that 10 percent of voluntary disconnects are either directly or indirectly caused by service problems. The MSO found that repeat service problems are the largest single cause behind voluntary disconnects.

Another recent study<sup>ii</sup>, by an independent research company, found that technicians had to visit 34 percent of new cable VoIP customers within 90 days of installation and that 16 percent required visits two or more times. Twenty-nine percent of the people experiencing problems said their "primary frustration" was with recurring quality deficiencies, while twenty-four percent said the frustration was with recurring reliability problems.

With various reports citing truck roll costs of anywhere from \$130 to \$200 per average visit, the operational costs combined with the costs of customer dissatisfaction are clearly too high for operators to sustain these levels of service problems. The obvious place to begin in the effort to cut these costs is with the installation process itself. Fortunately remedies are at hand that will help operators achieve a much higher level of assurance that service quality is where it should be when the installer leaves the home without adding significantly to the amount of time installers spend executing the work order.

### THE INSTALLATION CHALLENGE

Two major issues stand in the way of an MSO's ability to ensure digital voice service is performing at required quality levels upon completion of service installation. The first has to do with the amount of time it takes to thoroughly examine all potential problem areas using traditional means of testing and measurement. Getting a good quality read on levels from the primary outlet to be used for connecting the MTA (multimedia terminal adapter) to the cable network is typically all that time allows, which means that if the subscriber subsequently moves the MTA to another outlet, there is no assurance the same performance levels will apply.

Splitter locations, outlet-specific points of ingress, variations in microreflections depending on where lines are capped off can all produce significant variations in performance from one outlet to the next. Knowing where the weak points are gives the operator the option of either fixing them or advising the customer not to use those outlets.

Another problem has to do with the fact that contract workers are typically paid by the number of jobs they complete per day. Every time they encounter a problem that must be fixed, their time on the job is extended. Unfortunately, with manual entries

of performance parameters it's easy to 'fudge' the results to produce a performance report that makes it seem like a sub-par service meets minimal threshold levels. If the service is relatively clean and works at the time of installation, the fact that levels are below threshold may not lead to discernable problems until long after the installer has departed.

Measurements taken by installers also provide few clues as to the source of problems, with the result that the installer may go through time-consuming remedial steps that can be ineffective before he knows he must turn to network technicians for help. And even then he may not know whether the problem is network related or a problem associated with IP addressing, device identification or other data issues that require IT department attention.

Beyond the immediate impediments to efficient and successful installation, manual measurement and data entry provides an imprecise record of device and link status for use as a reference baseline for troubleshooting problems in the future. Thus, current methodologies not only contribute to post-installation problems; they impede efficient resolution of those problems when they occur.

### THE OPTIMUM HOUSE CHECK

Thoroughness in monitoring service performance is vital to ensuring potential sources of future problems are mitigated while the installer is still on the job. This includes taking stock of key internal and external network performance parameters as well as all metrics that are vital to proper performance of premise devices.

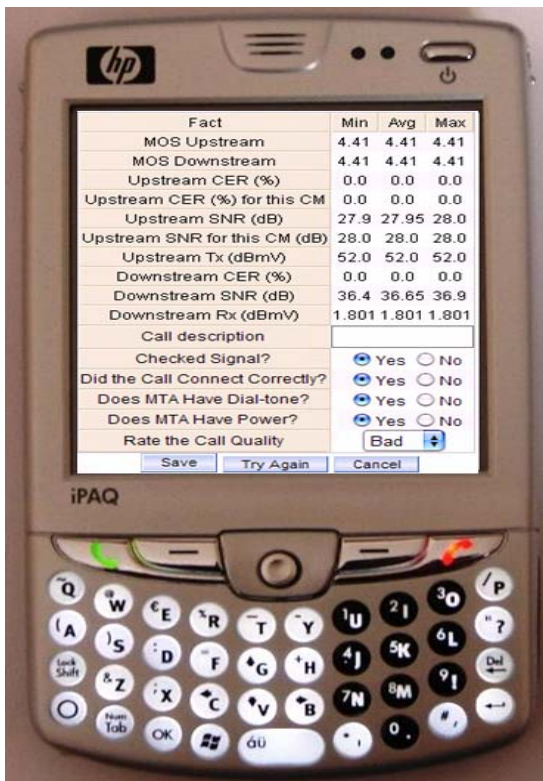


Figure 1: Handheld with House Check Metrics

These measurements must be accessible to the installer via standard handheld devices with user interfaces that clearly spell out the metrics with respect to each type of measurement. And measurements must be recorded and stored for immediate and ongoing access from Customer Service Representatives, Dispatchers, Engineers and NOC personnel. See Figure 1 for an illustration of handheld User Interface.

The MTA, of course, is an essential source of information about service performance. The House Check performed at the MTA should measure and record:

- Levels and persistence of errors generated from the external network;
- Premises wiring noise, distinguishing as to types such as ingress, device-generated noise and spurious noise from microreflections;
- Transmit and receive power;

- Provisioning status with regard to performance of voice and data interfaces, related service elements such as Soft Switches, NAP (Network Access Point) addresses, security, service levels, etc.

This degree of granularity in measurements not only assures all bases are covered with regard to assessing service performance; it also provides the information an installer needs in order to know whether he can fix the problem or, if he needs to request help, whether the problem should be addressed by network ops or an IT technical unit.

To provide a full perspective on service performance measurements from all VoIP-specific interior outlets the House Check should tabulate:

- MOS (Mean Opinion Scoring) – MOS is a measure of phone call quality and requires use of sophisticated algorithms in a software program that looks at several quality parameters, such as jitter, latency and packet loss, to determine where the voice signal should be placed on the industry standard MOS scale.
- Stability – It's essential that enough measurements be made over time across enough data points during installation to prevent over-reliance on what could turn out to be an anomalous performance reading taken on one data point at a single point in time.
- Inside wiring performance – The installer must be able to assess power and signal-to-noise levels at every outlet and take remedial steps to adjust levels to compensate for the impact of splitters and spurious noise from microreflections.

In addition, the installer should have at his disposal a ready means of measuring and recording levels at the tap and ground block. These measures not only serve to identify whether there are local outside plant issues; they also create a clear benchmark for gauging contributions of in-home wiring and other elements to signal degradation at all VoIP-specific outlets. And the technician must be able to perform these measurements with respect to transmit and receive parameters across all VoIP-related DOCSIS channels.

### THE ENABLING SOFTWARE INFRASTRUCTURE

Creating an easy-to-use, thorough House Check process as described above requires a well-conceived software infrastructure that fully exploits the data collecting power of DOCSIS with complete compatibility with multiple vendors and support for multiple DOCSIS and PacketCable devices, including CMTSs, call management servers, media gateway controllers, cable modems, DOCSIS set-tops and MTAs. To be useful beyond the installation stage, the software should interface with a complete VoIP lifecycle management solution that optimizes on-going fault and performance management.

The system must be able to isolate and resolve issues at the time of installation and beyond by providing real-time and historical data about premises devices, supporting interfaces and the CMTS. This includes the ability to identify and resolve typical transport issues such as jitter, fragmentation, latency and packet loss. The system must be able to draw together and interpret real-time and historical information for any given premises device, providing detailed views to the NOC on location, configuration, settings and performance while delivering read-outs of pertinent device information on the technician's handheld at the customer site.

Beyond the initial install, the system must be able to generate real-time and historical reports reflecting performance over time. With this level of comprehension the system should be able to isolate and prioritize problems and provide quick and efficient recommendations to resolve the issues, both at the time of install and subsequently whenever problems arise.

As part of the analytical process, the House Check support system should be able to go beyond generating raw performance metrics on a per-device, per-location basis to calculate a MOS score for the service at all end points. Such MOS summaries measure network health by determining availability in terms of Degraded Modem Hours (DMH) or Severely Degraded Modem Hours (SDMH), and identify network issues that are causing QoS-sensitive applications such as voice to fail.

### The Full Scope of House Check Benefits

There are many immediate and long-term benefits to be derived from implementing a House Check process like the one described here. From the installation perspective, the process reduces the time spent by installers on each job and provides operations support staff a complete picture of post-install performance at the site versus what the performance looked like when the installer started running the analysis.

The process eliminates time-consuming manual measurements and correlation of different types of performance parameters at the tap, ground block and premises outlets. Instant feedback minimizes time spent on troubleshooting. And, if more work is required, the process further cuts installer work load by automatically creating thorough maintenance work orders.

Another enormous benefit is the ability to quantitatively measure and report ‘success rate’ of installs by individual installer or groups of installers/contractors. The most capable installers can be recognized and given more ‘challenging’ installs and trouble calls. And the less capable installers can receive training in specific areas that are deficient. Gone are the days of wondering which staff are the most capable and which staff repeatedly have install/trouble call difficulties.

Beyond the installation phase, the information generated by the House Check establishes a comprehensive data base which Customer Service Representatives, Dispatchers, Engineers and NOC personnel can use to trouble shoot problems over time. For example, a shift in MTA readings that matches the readings taken at a secondary or tertiary outlet during installation can indicate the device has been moved, allowing the CSR to suggest it be put back in its original location to avoid a maintenance call. And, if a truck roll is necessary, the comparative readings can tell Customer Service Representatives, Dispatchers, Engineers and NOC personnel whether the problem is plant related or, if it’s on premises, what type of expertise and equipment will be required to perform the work.

The operational savings resulting from implementation of a House Check process are evident across several parameters. The process ensures a higher success rate for VoIP installs and virtually eliminates post-install trouble calls. Over time there are fewer complaints per customer, which increases customer satisfaction. And when there are problems, less time is spent trouble shooting and fixing them. Moreover, the accumulated performance record across service areas allows NOC personnel to discern patterns in the problem reports that can track problems geographically.

## CONCLUSION

Now that MSOs have made the business case for digital voice to where they are scaling service to millions of households, the bottom-line focus necessarily shifts to finding ways to reduce costs and raise customer satisfaction.

The opportunity to eliminate the primary cause for voluntary disconnects, namely repeat trouble calls, while significantly lowering installation and ongoing operations costs is one of the great benefits the cable industry derives from operating in the packet-based DOCSIS environment. Now, with the means at hand to support whole-home House Check functionality, operators can look forward to ongoing improvements in the bottom-line performance of digital voice.

## References

---

<sup>i</sup> Undisclosed MSO Customer Data

<sup>ii</sup> MSO-commissioned study