



Future Proofing Through Provisioning

A white paper by Incognito Software
August 14, 2009

Future Proofing Through Provisioning

DOCSIS 3.0: The Need for Speed	2
Leveraging DOCSIS 3.0 through Services.....	3
Laying the Foundation: Provisioning Requirements	6
Conclusion.....	7
About Incognito Software	7
About the Author.....	7

DOCSIS 3.0: The Need for Speed

As subscriber thirst for greater internet speed and volume remain unquenched with DOCSIS 2.0 technology, Cable Operators are under increased pressure to offer higher bandwidth as well as a wider breadth of services in order to maintain and increase market share. Increasing threats from Telecom Service Providers, who are in some cases touting up to 100 Mb/s service on FTTH technology, further amplifies this pressure. With the DOCSIS 2.0 standard offering only a maximum of 37 MB/s downstream and 27 MB/s upstream, the technology simply cannot handle the demands of today's competitive marketplace. It has become obvious that DOCSIS 3.0, with a maximum bandwidth of 160 Mb/s downstream and 120 Mb/s upstream and its capacity for enabling future technologies, is the key to overcoming these hurdles.

Sidebar 1: What is DOCSIS 3.0?

Data Over Cable Service Interface Specification or **DOCSIS** is an international standard developed by [CableLabs](#) that defines the communications and operation support interface requirements for a data over cable system. It permits the addition of high-speed data transfer to an existing [Cable TV](#) (CATV) system and is deployed by many Cable Operators to provide internet access over their existing infrastructure.

First created in 2006, the latest version of this standard significantly increases transmission speeds both upstream and downstream and introduce support for IPv6. DOCSIS 3.0 achieves this with channel bonding technology which allows multiple lines to be bonded thus allowing greater bandwidth.

Compared with DOCSIS 2.0, which offered a maximum of 37Mb/s downstream and 27Mb/s upstream, DOCSIS 3.0 increased this maximum by more than fourfold by offering a maximum of 160Mb/s downstream and 120Mb/s upstream. DOCSIS 3.0 also permit a return path frequency response of 5MHz-85Mhz, a vast improvement over the current North American return path spectrum of 5-42Mhz.

Leveraging DOCSIS 3.0 through Services

While DOCSIS 3.0 is widely recognized as a key building block in the foundation of the Cable Industry's future success, it is about more than just speed. DOCSIS 3.0 is a technology that will enable operators to offer truly differentiated services such as Switched Digital Video along with IP content into the subscriber home and IPTV. Its channel bonding capabilities will allow Cable Operators to compete against Telecom Service Providers for lucrative enterprise accounts by providing dedicated bandwidth to support services such as video conferencing and online training.

Other DOCSIS 3.0 benefits and enabled services include:

- User-defined interactive programming
- Time shifted and place shifted video such as video on demand services
- Interactive online gaming
- Convergent media services such as allowing data to be viewed on a TV and video content to be viewed on a computer monitor
- 128-bit AES encryption for additional security
- Support for IPv6 thus safeguarding the Cable Industry's future

Table 1 below provides a brief comparison of the features, benefits and services enabled offered by the various DOCSIS versions.

Table 1: Comparison of DOCSIS Versions

Version	Features	Benefits	Services Enabled
DOCSIS 1.0	Basic Broadband Internet Connectivity for one more or devices in the home	Made interoperability of cable technology a reality for Cable Operators and subscribers and made standardization of cable modems possible	High-speed data on cable modems
DOCSIS 1.1	Improved operational flexibility, security and quality of service (QoS) features	Enabled Cable Operators to configure guarantees on data rates and latency of the service	High-quality digital voice, interactive gaming and commercial service level agreements
DOCSIS 2.0	Increased upstream reliability and throughput for symmetric services	Increased upstream throughput to 30 Mbps of capacity	Increase capacity for delivering high-speed data
DOCSIS 3.0	Channel bonding Capabilities, support for IPv6 and IPTV	Allow Cable Operators to provide data rates in the hundreds of megabits	IPTV

In terms of increasing bandwidth, DOCSIS 3.0 is also a more cost effective option than system-wide network upgrades. However, change cannot happen immediately, and in order to take advantage of the optional upstream channel capacity offered, operators will need to address all active and passive equipment in the HPC network so that they are

configured to tolerate this shift. So while DOCSIS 3.0 can have tremendous impact on the future of the Cable Industry, it will require a remarkable amount of preparation. That being said, DOCSIS 3.0 can in fact solve an immediate issue regarding the current residential subscriber demand for bandwidth.

For residential subscribers on shared bandwidth, the key to success with DOCSIS is not brute force with speeds, but providing them with the speed they need, when they need it and throttling back when it is not needed. Simply due to the gap between subscriber demand for speed and the price they are willing to pay, a shift in how bandwidth is offered within the industry is required. To illustrate this, an example of a tier-1 Cable Operator's residential services pricing is shown in the diagrams 1 and 2 below and on the following page:

Diagram 1 – Residential Packages Offered and Pricing Per Megabit

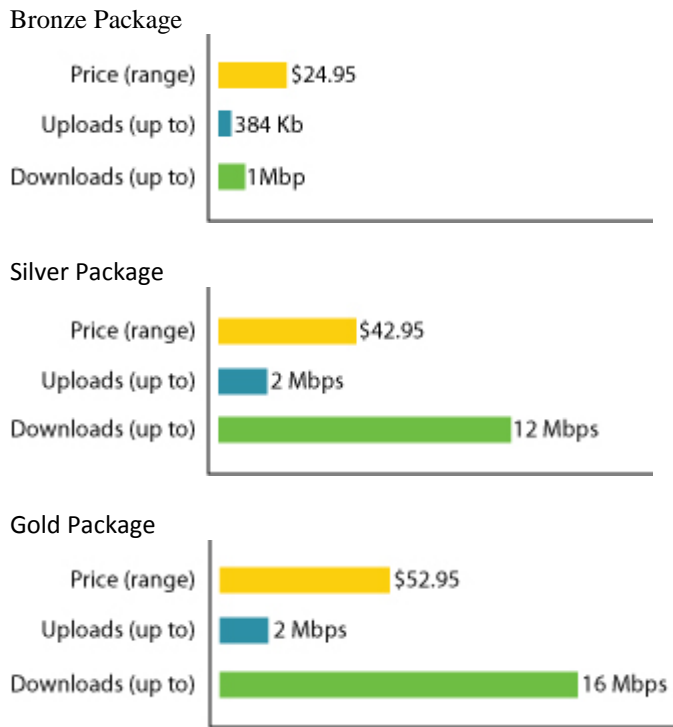


Diagram 1 represents the difference in pricing between the three residential packages offered by this Cable Operator. Note that the pricing, represented by the yellow bars, grow at a much slower rate than the number of Megabits offered, represented by the green bars, the increase in Megabits offered.

Diagram 2 - Revenue per Megabit

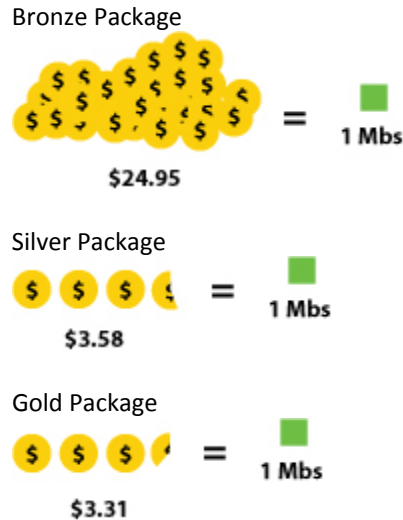


Diagram 2 represents the revenue per megabits. The number is reached by dividing the price of each service package with the number of megabits offered in each respective package.

In this real life example, the Cable Operator offers 3 services levels at different price points. Analyzed from a downstream per megabit perspective, residential customers are paying \$24.95/Mb in the Bronze package as opposed to the \$3.58/Mb for the Silver and \$3.31/Mb for the Gold package. Due to economies of scale, it is not surprising that the Cable Operator actually makes the most return per megabit on the lowest speed product. What is surprising, however, is the vast difference between the price per Megabit between the different service levels. Based on this pricing model, if a Cable Operator wanted to offer a 100Mb service level, the price difference would be calculated as follows:

$$100\text{MB} - \boxed{16\text{ MB}} \times \boxed{(\$3.58 - \$3.31)} = \boxed{\$22.68}$$

A B C

- A. Gold package
- B. Difference between silver and gold package in price per megabit
- C. Difference in price between 16Mb and 100Mb offering

$$\boxed{\$22.68} + \boxed{\$52.95} = \boxed{\$72.63}$$

A B

- A. Price of 16Mb gold package
- B. Price for a 100 Mb package based on this pricing model

\$75.63/100 MB = \$0.76 Per Megabit



Based on the calculations on the preceding page, the final price per megabit in a 100Mb package would be \$0.76.

Clearly, this is not the optimal pricing model for Cable Operators and it is more profitable to attract subscribers to the lowest level package and save cost on bandwidth upgrades. Unfortunately, subscribers usually want more than 1Mb per second. Due to the pricing offered by Telecom Service Providers and the disparity between the speed subscribers demand and the price they are willing to pay, simply increasing pricing for the Bronze and Gold packages will not be the solution to this problem.

Residential subscribers may demand Internet packages of over 16Mb/s during peak hours of use. Considering the current pricing expectations, this simply does not make financial sense to a Cable Operator to dedicate this bandwidth to all. For now, it will be more beneficial to attract subscribers to 'bandwidth on demand' products for extending bandwidth when it's needed. This is where DOCSIS 3.0 comes into play. By providing bandwidth when it is needed instead of raw bandwidth that is available to every customer, DOCSIS 3.0 technologies enable Cable Operators to fulfill the current needs of their subscribers.

Laying the Foundation: Provisioning Requirements

However, none of this matters without the proper modems. Deploying DOCSIS 3.0 modems today will ensure that subscribers are equipped to receive increased capacity when it's needed and at a price they are willing to pay.

To take advantage of these new DOCSIS 3.0 modem capabilities, Cable Operators must utilize a device provisioning solution that can create dynamic configuration files for DOCSIS 3.0 modems and has full support for DOCSIS 3.0 parameters. Additionally, the solution should also have a full feature set that will allow the Cable Operators to future-proof their investment and deploy any future multimedia services enabled by the DOCSIS 3.0 and other standards. Solutions that meet these requirements are the minority and Cable Operators need to be aware of the pitfalls of relying on solutions that do not deliver on these essentials.

Problems with open source home grown device provisioning software include questionable support model and lack of security. This type of software may have recurring support costs that occur due to errors, lacking support for type length value parameters (TLVs) and improper packet handling which over a long term outpace the cost of a commercial provisioning solution. An excellent example is the inconsistent support of PacketCable provisioning flows. Although PacketCable identified three provisioning flows for MTA devices: Basic, Hybrid and Secure, not all provisioning solutions supports all three flows, leaving Cable Operators with limited choices when deciding the level of security needed.

On the other hand, legacy provisioning systems have not kept pace with the advances in standards development such as DOCSIS 3.0, PacketCable 2.0, dynamic file generation and so forth. Thus, these systems fail to deliver on performance with low device per second results. A lack of modern APIs causes problems in managing subscribers in and out of the system.

With this in mind, Cable Operators looking to future proof their investments and deploy new technologies should seek out a solution that have a full feature set that supports that latest standards as well as a solid software development roadmap.

Conclusion

With tremendous benefits for the Cable Industry, DOCSIS 3.0 is the key to future proofing a Cable Operator's network. Though it may not be possible to deploy all of DOCSIS 3.0 capabilities today, there are immediate demands that can be satisfied with this new technology. However, this must be supplemented with a device provisioning solution with full standards support and upgrades for future technologies. Not only will this help Cable Operators avoid unexpected hidden costs and offer future services but also help them satisfy immediate needs for bandwidth by demand.

About Incognito Software

Incognito Software is an industry leader in empowering broadband providers to increase revenue through rapid and easy deployment of its provisioning software. With support for the latest DOCSIS and PacketCable standards, Incognito's Broadband Command Center helps service providers worldwide deploy cost-effective and reliable data, voice, and video networks. Address Commander, Incognito's IP address management solution, allows the management and administration of both IPv4 and IPv6 address blocks simultaneously, simplifying and maximizing the use of the IP address space. Name Commander, Incognito's domain management system (DMS), provides a centralized system that manages DNS servers. All these products may be integrated to provide complete solutions.

Incognito's clients include world-class service providers like NET Brazil, Telmax, BT, Starhub and Cox and its products are deployed world-wide.

About the Author

Chris Busch is the Vice President of Broadband Technologies at Incognito Software and is responsible for the vision and management of Incognito's technologies for IP and multimedia convergence. He brings over 12 years experience in broadband markets including cable, wireline, wireless, and satellite.

Previously with Nortel Networks as Senior Technology Advisor to the CTO of Cable MSO Global Solutions, Chris has also led teams in terabit IP core routing, BRAS IP services, wireless IP access, wireline and cable MSO access, video on demand, and triple-play IP video solutions. Chris draws on a wealth of knowledge in cable MSO video and IP data networking that are key to emerging PacketCable 2.0 standards for subscriber service and device management related to 3G IMS and SIP-based technologies and has written numerous articles for Communications Technology Magazine.

Incognito Software Inc.
Phone: 604.688.4332 or US/Canada toll free 800.877.1856
Fax: 604.688.4339
Email: sales@incognito.com
Web: <http://www.incognito.com>