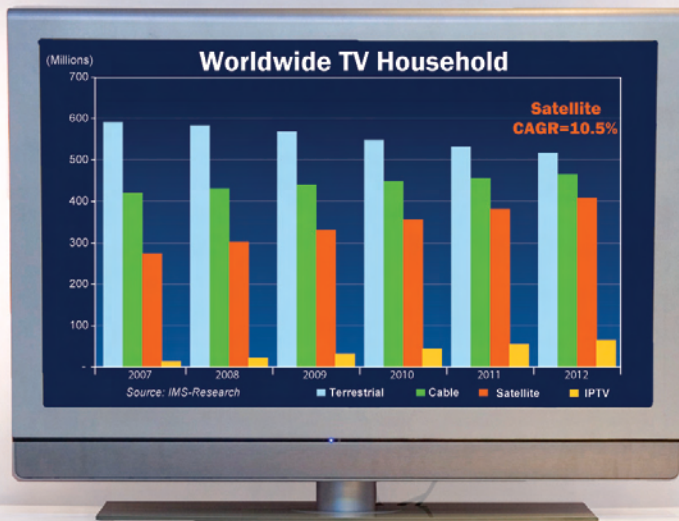


## Changing DBS Delivery – The Single Wire Solution

Over the last five years, the satellite market has continued to increase subscribers globally and is projected to grow at 10.5 percent compound annual growth rate through 2012.



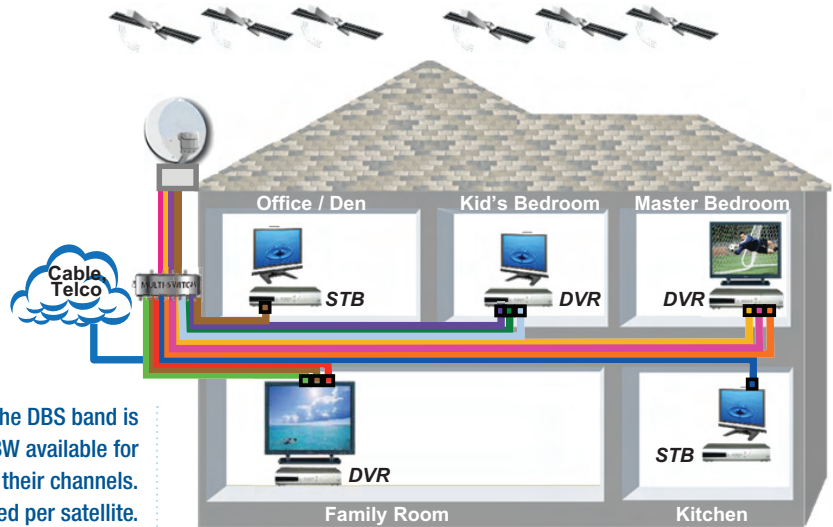
This growth is largely driven by the attractive packages and the availability of HD content, live sporting events, ethnic programming, local content, and premium movies which provide entertainment value to the end consumer. Consumer demand for advanced entertainment options such as digital video recorder (DVR), or personal video recorder (PVR), and their high satisfaction with the experience is lowering service provider churn rates. The phenomenon is helping service providers offset the investment required to deploy these advanced services and remain competitive.

### INSTALLATION COMPLEXITY

Changes in the TV viewing experience and the adoption of DVRs, sometimes multiple DVRs per household, have created an increasingly complex, difficult, and expensive installation for DBS service providers. Traditional DBS installations consist of one or more dishes with an applicable low noise block (LNB) converter. The output(s) of the LNB is either run directly to each satellite set top box (STB) in the home, or to a multi-switch in which the outputs are then run to the STB. An individual cable run is required from either the LNB, or multi-switch, to each tuner in the STB. A typical DVR/PVR has at least two tuners to support watch and record functionality. For a traditional DBS installation, this DVR would require two cable runs to the STB. A home with three DVR STBs would require six cable runs. One can see how this complex cabling architecture would be an area of concern for the DBS Operator and homeowner alike.

**By Troy Brandon, Entropic Communications**

## Changing DBS Delivery – The Single Wire Solution



At the output side of the LNB, the DBS band is 950-2150MHz; this is 1.2GHz of BW available for the Operator to use to support all of their channels. Typically there is 4GHz of BW required per satellite. This is usually broken into 500MHz to 1GHz bands in order to fit into the 1.2GHz BW available on the cable. As operators add satellites, their BW needs increases accordingly. With only 1.2GHz of BW available on a cable, the DBS industry has developed communications standards that allow the applicable polarity band (500MHz to 1GHz of BW) to be switched down the cable. Which band is switched down the cable depends upon which channel the end user is requesting at the viewing location. A single channel is ~32MHz depending upon the operator modulation scheme. The viewer only wants to look at the single channel, but to see the individual channel the whole band needs to be switched down the cable. The STB tuner then tunes across this band to the required channel. Additional satellites require complex switching configurations in the LNB.

### Traditional DBS Deployment Model

Many new customers are unaware of these cabling complexities when signing up for a new DBS subscription or DBS service. In San Diego, local installers report initial installation rejection rates as high as 15 percent. For the operators, consumer rejection not only represents lost subscription revenues, but also higher operating costs. For example, at the point of rejection, the DBS Operator has invested in the installer's truck roll and all the equipment required for the expected installation, but has nothing to show for it. The customers, who do not reject the DBS installation, have to live with unsightly large cable bundles required to support the complex cabling network.

However, in most US homes, there is a cabling network already in place. This usually consists of a single point of entry at the curb or garage with splitters used as required to support multi-room outlets. This preexisting network goes largely unused during a traditional DBS installation, resulting in a lost opportunity to leverage the existing cabling and extra labor and material costs to the Operator.

## Changing DBS Delivery – The Single Wire Solution

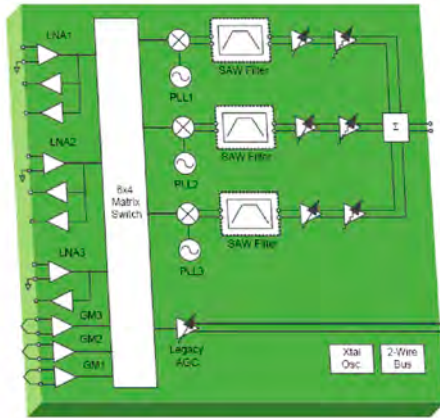


DBS customers and operators alike face another problem with traditional installations when upgrades or additional services are implemented. For most installations, an installer would typically add exactly enough cabling to support the customer's initial order. For example, if the customer wanted a DVR in the main viewing location and a single tuner STB in the master bedroom, the installer would run the required three cables, hook up the STBs and leave. A few months down the road after the customer has fallen in love with the DVR convenience, they call up the Operator to swap out the single tuner STB in the master bedroom with a DVR. This upgrade will require another truck roll to the premise, another cable run to the master bedroom, and then the simple swap out of STBs.

With most large DBS Operators offering some form of Pay Per View (PPV) or Video on Demand (VOD) services, each STB is typically required to connect to a phone line. In many cases, the DBS installer must install a phone jack near the STB or run long phone lines around the room. In addition to these advanced services, DBS Operators need to incorporate Home Networking capabilities such as Multi Media over Coax (MoCA<sup>®</sup>) into their systems. Traditional DBS systems require the full 950MHz to 2150MHz band to be used to support all the channels, below this band is Cable and Terrestrial TV. This does not leave large gaps of open bandwidth on a cable network.

## Changing DBS Delivery – The Single Wire Solution

Channel Stacking Switch  
Integrated Circuit Architecture



A Channel Stacking Switch IC is a multiple-input multiple-output device. It typically has N 1.2GHz inputs that can be cascaded to additional chips as required (to expand output capacity). These inputs are fed into a large N-pole M-Throw switch that outputs to M mixers. Each mixer path then translates only the user requested transponder to a predetermined fixed frequency within the 950-2150MHz band. This fixed frequency is unique for each tuner on the single cable output. Each tuner in the STB always stays at this fixed frequency while the CSS IC translates the user requested content down the cable to this exact frequency. This architecture requires no hardware change to the STB design. Communications protocol between the CSS IC and the STB is handled via the CENELEC EN50494 standard or proprietary systems.

### SINGLE WIRE SOLUTION

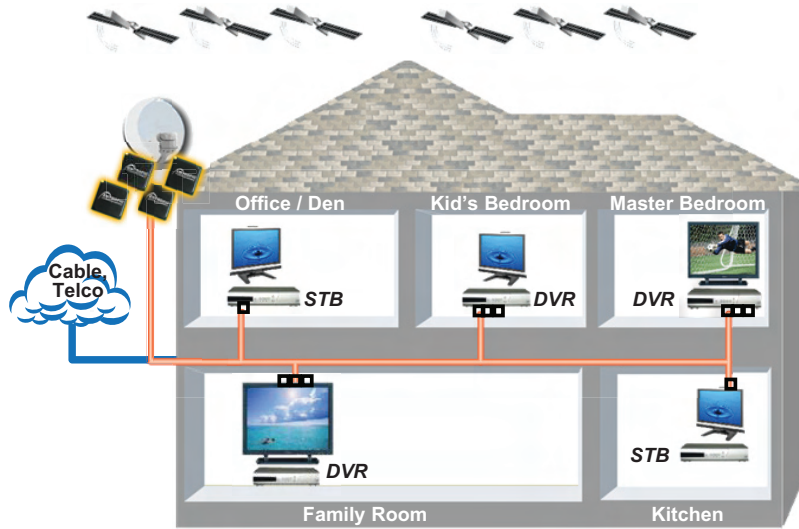
Satellite service providers are investing in ways to reduce the problems associated with providing advanced services to their subscriber base and simplify the overall installation and upgrade process. The viable solution should allow for easy installation, easy upgrades, multiple tuner support and enhanced aesthetics for the subscriber.

This solution exists and is being adopted today by DBS providers in the U.S. and Europe. The solution leverages the coax infrastructure already in the house and delivers DBS programming over a single wire.

Channel Stacking Switch (CSS) products support multiple polarity bands down a single cable. Instead of switching the entire polarity band down the cable as in traditional multiswitch products, a CSS IC allows just the customer requested 32MHz channel to be switched down the cable. This allows many tuners to be supported inside the home across the 1.2GHz of total BW available. There is filtering required to ensure that each video channel (or User Band) does not interfere with each other, which bumps the channel spacing to ~102MHz. This allows for 12 unique tuners to be supported down a single cable run.

With a CSS integrated solution the DBS Operator can provide a customer installation experience without the complexities tied to typical installations. A single cable feed into preexisting coax wiring not only drastically simplifies the installation but also provides substantial material costs savings. The “No New Wires” ideal is a reality with CSS products. The Installer is in a much better position to up-sell equipment at the customer site and utilize best practices for the installation. Fewer HW connections lend to higher reliability and an improved HD experience for the end user.

## Changing DBS Delivery – The Single Wire Solution

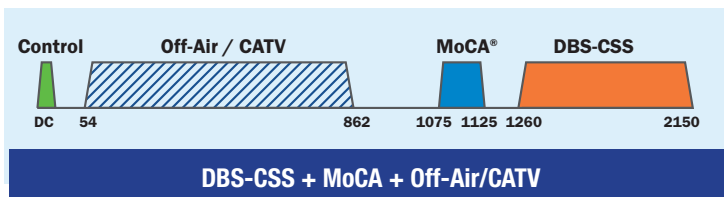


### DBS Deployment With CSS

This product provides the future proofing needed for allowing plug and play upgrades. When a user wishes to upgrade to a DVR the DBS Operator can ship the product directly to the customer versus an expensive service call.

A single cable network allows VOD and PPV support with only a central conveniently located phone line connection versus a connection at each STB location. Additionally, with the CSS frequency agility, a DBS Operator is able to create large chunks of BW within the 950MHz -2150MHz band. This entire band is reserved for DBS service, which provides the Operator means to incorporate a whole home networked system.

### DBS CHANNEL STACKING SWITCH FREQUENCY PLAN



Ensures co-existence with other services on the same cable

Providing a solution for advanced services has a major positive impact on the DBS Operator's ability to compete in the competitive business of Pay-TV.

A CSS solution enables DBS Operators to lower their Subscriber Acquisition Cost (SAC) by reducing equipment and installation costs, increase Annual Revenue Per User (ARPU) by enabling churn reducing DVRs and advanced commercial services such as VOD and Whole Home Networking. Installation complexities are removed as a barrier to entry and upgrade costs are drastically reduced. A single cable network increases reliability and quality of service while providing a shielded closed network to each home viewing location. When CSS and home networking solutions such as MoCA are combined, DBS Operators increase their competitiveness and ability to satisfy the consumer.

#### About the Author

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#### About Entropic Communications®

Entropic Communications, Inc. is a leading fabless semiconductor company that designs, develops and markets systems solutions to enable connected home entertainment. The company's technologies significantly change the way high-definition television-quality video and other multimedia content such as movies, music, games and photos are brought into and delivered throughout the home.