September 2003

Important Considerations for Video Over xDSL and Applicable Solutions

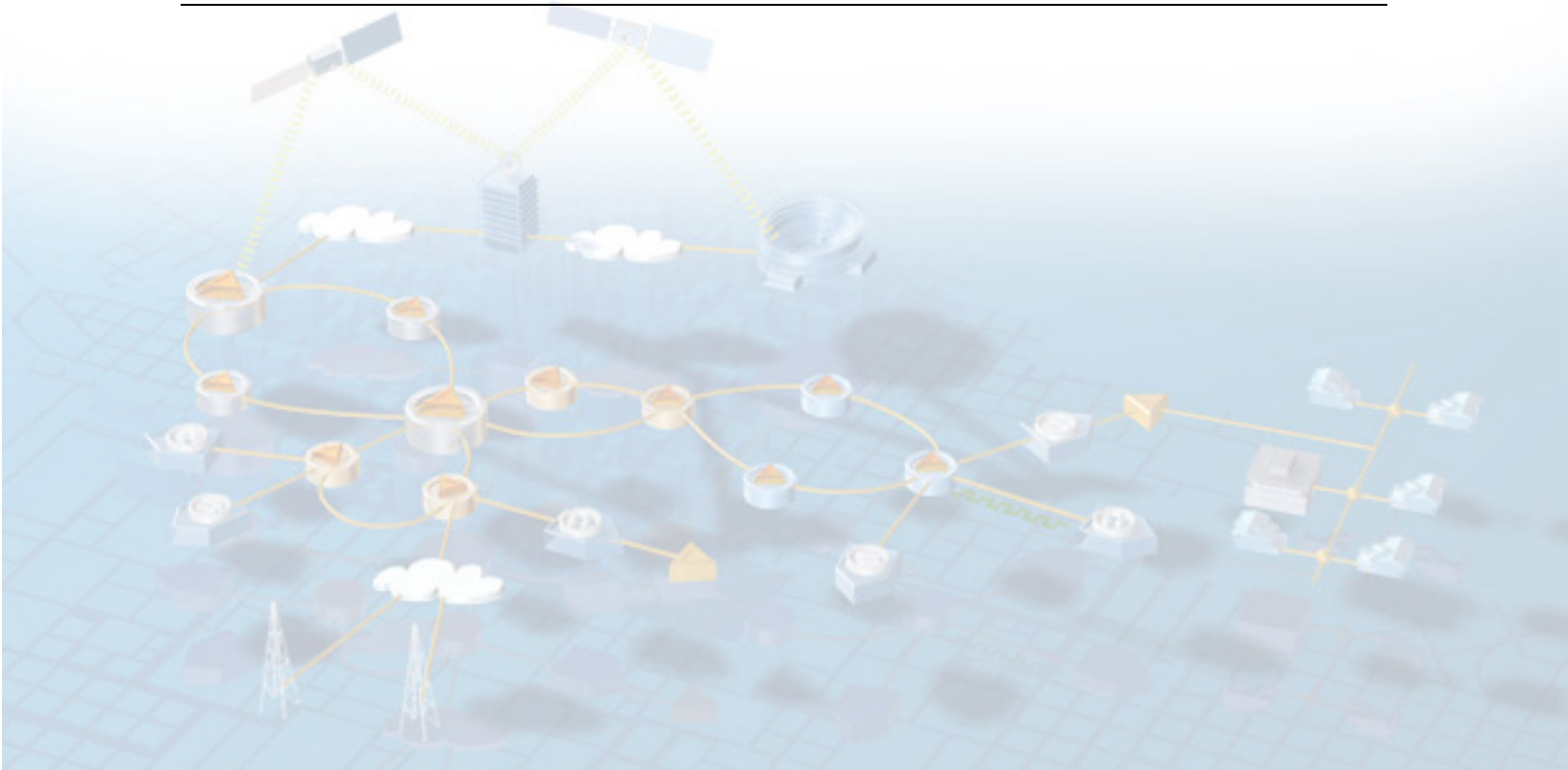
Technical Paper

Introduction

Introducing innovative and appealing new video services on DSL networks has never been more attractive, nor more realistic to realize, than today. At the same time powerful, professional video headend equipment has become affordable, due to recent advances in for instance transrating and encoding technology.

This document aims firstly to give an updated perspective of the opportunity that lies in front of telecom operators in the form of video services on their Digital Subscriber Line (DSL) broadband access networks, including considerations of relevant service offerings and experience gained by the pioneers in this field.

Secondly the document sets out to explain how the 50+ years of experience Scientific-Atlanta has in the video industry can be leveraged into this market, and be brought to contribute to an attractive business case, allowing video service provided on DSL networks to be processed through highly powerful and cost efficient video headend solutions.



The Opportunity

The Initial Attempts

The idea of "Video on DSL" is not exactly new. It has been discussed for at least the last 10 years, forming part of many a telecom operator's dream of a future network. It has experienced periods of hype and excitement, followed by more depressed periods where "it didn't really happen, after all".

New Factors Promoting Video on DSL

Now we are at it again – the concept of video on DSL is experiencing a resurrection in interest all across the industry. Understandably people, learning the lessons from the last decade, are somewhat skeptical. However, things have changed. There is now a range of fundamental factors that have changed dramatically, which indicates strongly, that video on DSL is now, finally, becoming a reality. Some of these factors are:

- **Declining telephony revenue**. Today, tele operators are more than ever faced with a very serious and very basic problem: first of all the cash cow of the last decade, the telephony revenue, is slowly - but steadily - declining. Even though people spend more time talking on the phone, prices erode quicker, leaving a picture of declining revenue. Much the same can be said about data, where data volume grows rapidly, but revenue at the best stays steady. This leaves the tele operator in the situation of a fundamentally unhealthy business. This to a point where some telecom operators seriously consider to sell off the twisted pair infrastructure they have spend the last several decades digging down and installing, unless they can find ways to reverse this trend.
- **Increasing Popularity of DSL**. Deployment of xDSL grows dramatically. Where DSL a few years ago was haunted by technical concerns on loop quality, provisioning nightmares and resulting unhappy customers, DSL has now become extremely popular among consumers and installation of DSL lines worldwide has experienced a tremendous growth over the last few years. Over the last one year it has approximately doubled to count over 40 million lines worldwide. Despite the current harsh financial climate – also for telcos-- the momentum of DSL installations remain unaffected. Annual compound growth rates of close to 50% per year are expected to continue for the coming years. This development is lead by Asia, followed by Europe and then the US. This leads to increased competition and better and higher performing equipment at ever decreasing prices, that is, the value for money achievable with today's DSL equipment is dramatically improved compared with what was achievable just a few years ago.
- **Reduced cost of video on DSL**. It is always expensive to purchase first generation equipment. However, the cost of offering video services over DSL has gone down dramatically. Just over the last 3 years, in general it is estimated that the cost of building a video on DSL access network has been reduced with typically a factor of approximately five (5).

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The Opportunity, Continued

- **More bandwidth**. The emergence of new variants of Asymmetric Digital Subscriber Line (ADSL), as for instance ADSL 2 and ADSL 2+, which is likely to be deployed as standard in most ADSL Access equipment shipped towards the end of 2003, promises a cost efficient path to supply higher bandwidth ADSL, offering 10–20 Mbit/s or more to very high percentages of the population.
- **Competition from the cable TV industry**. The cable TV industry has not become any less of a competitor to the tele operators over the last few years, quite on the contrary. In many markets roll out of triple play offerings, including video services, telephony services and high-speed data services has never been more aggressive.
- **Extra revenue**. Depending on market and competitive situation, recent experiences and analysis show that adding video services to the consumers bill of telephony and data, will add in the range of 20-30% extra revenue, and at the same time reduce churn dramatically.

This leaves many telecom operators in a situation where they simply must react now to maintain their competitive position and defend their revenue, but at the same time also in a situation where it has never been more favorable to do so via video service offerings.

The Importance of Services

Knowing Which Services to Offer

Probably the most important question to ask is "Which services should be offered to my customers?" The answer to this will make or break your video on DSL business. Many trials and smaller commercial installations have been made over the years. Clearly there is no such thing as a "one size fits all" solution to the challenge, it has to be carefully analyzed and all specific local factors have to be counted in. On a general level, however, we are now at the point in the learning curve with video on DSL that at least some findings have become quite evident.

General Findings

A few findings are listed below:

- **Broadcast TV**. DSL may not be the simplest way of distributing broadcast TV right now. On the other hand, operators cannot compete with other delivery channels like cable, satellite and terrestrial, without having broadcast TV in their video on DSL offering.
  It is very clear that if the only service you offer is broadcast video/free-to-air channels, it will be very difficult to compete with cable and satellite. Cable and satellite were invented and built specifically for this purpose. These distribution mechanisms can be expected to distribute the broadcast cannels with low cost, also in the future – perhaps lower than what DSL networks can offer. On the other hand, as IP set top boxes are relatively simple devices, and therefore should come rapidly down in prices as the market accelerate, it can be argued that the rapidly eroding extra cost in order to offer broadcast content on DSL networks, already offering high speed access for internet use etc, will make broadcast content on DSL the most cost competitive solution in the long run.
  It is also very clear that if a telecom operator expects a consumer to switch to a video on DSL service, it simply must include a normal broadcast service offering of 30, 100 or more channels. This is "the" fundamental TV offering, a common denominator that is a must-have for most consumers. If the Telecom operator does not offer this service, the consumer will still be forced to keep his cable or satellite connection.

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- **Services not easily offered on cable or satellite**. Instead of just copying the offerings of the established broadcast world, telecom operators should carefully consider which attractive services their DSL access network is inherently better suited to offer, and use these possibilities as differentiators. On a general level DSL is very well suited to serve even very small groups of people with very individualized content. The aspect of "unique user bandwidth" is important[1].

  DSL- and FTTx (Fiber)– networks are generally able to offer the highest amount of bandwidth to a single user over the access network. Some examples include:

  – **Local content**. Experiments in UK, for instance, have shown that people have a very high interest in local content - the more local the better - virtually down to the neighborhood level. DSL networks are very well suited to offer this "super localized" content, probably better than satellite or cable TV, as only the access network will only carry this content to the specific subscribers that request it – it will not take valuable capacity which could be used for other services, as it would for instance in a "shared media" as a cable TV coax segment.

  – **Specialized content / "magazine style content".** Considering the wealth of magazines available on all sorts of topics, all the way from house & gardening, to veteran cars, trains, fashion & lifestyle, military, science etc., a market will exist for a "TV version" of this type of content as well. The areas of interest are well defined, and people will happily spend 5-10$ on a magazine of special interest – again something which is also likely to be the case, should the media be video rather than paper. In contrast to satellite and cable, DSL can serve few customers with this content in a cost efficient way.

  – **Build your own program package.** Many cable TV subscribers for instance subscribe to a certain package with e.g. 30 programs. In reality most people only chose a certain program package to view a few favorite channels; the remaining channels just come along as "part of the deal". The possibility to tailor exactly the program package you wish, with a selection of hundreds of channels to choose from, is technically quite uncomplicated to do in a DSL network. It is simply a question of allowing the user access to the desired subset of programs from the multicast enabled router/DSL Access Multiplexer (DSLAM) – having all available programs circling on the backbone/aggregation network side.

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[1] Satellite, for instance, provides high bandwidth with literally hundreds of TV channels available. However the satellite media at the same time covers millions of households, so the possibility of offering something special for each subscriber is hardly there. Terrestrial TV distribution method offers fewer services, but also cover fewer subscribers per transmitter – typically in the range of 100.000's. Cable in contrast typically serves a coax segment with ~1000 households. Coax inherently is able to carry high bandwidth, as frequencies close to 1 GHz are possible. DSL and FTTx in contrast are able to offer from a few up to several tens of Mbit/s to each individual subscriber.

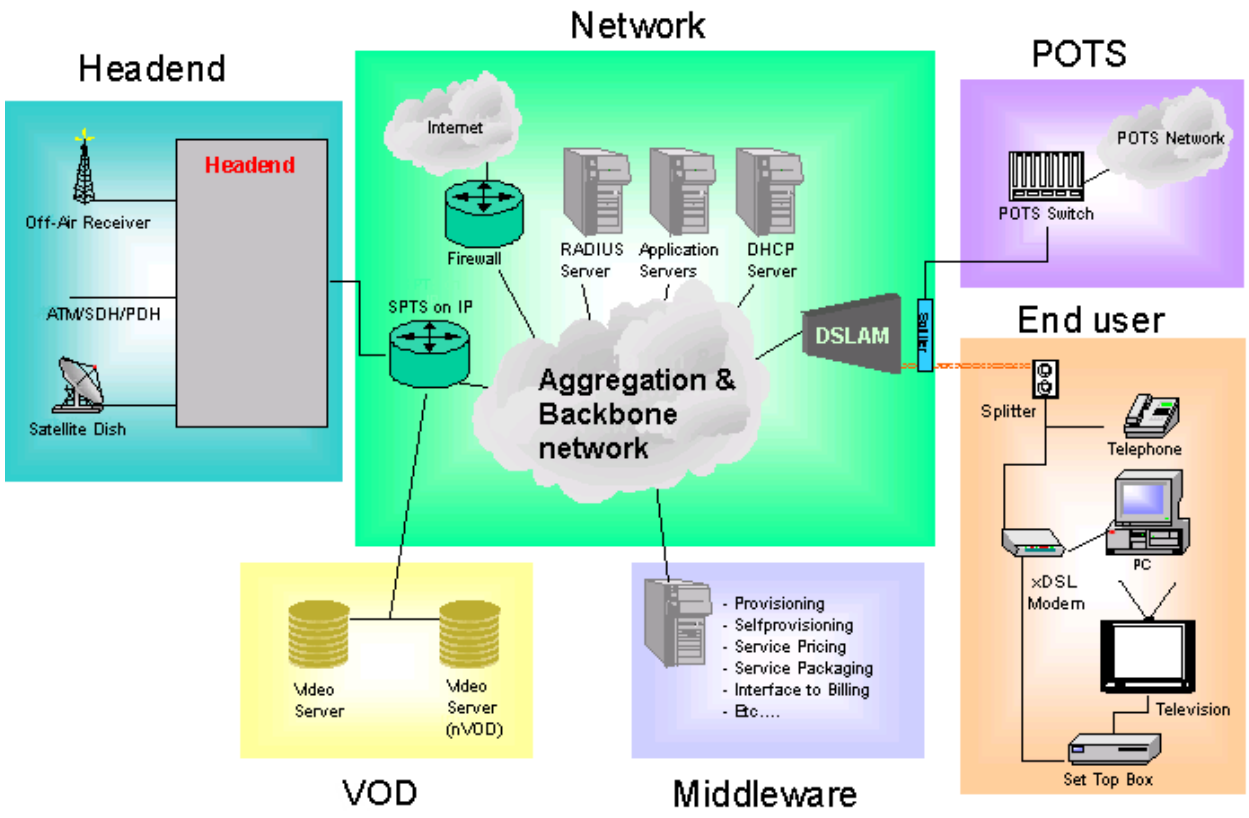
- **"New services on demand".** Adding new services becomes a very simple and easy exercise – streaming of special events outside the normal TV channel structure is an example. In essence, "the world can be your content source".
- **Channels for minorities from other countries** (Content from the country of origin). Many people in the western world live in shorter or longer periods away from their country of origin. To these people, the ability to watch programs from their home countries is very desirable. As an extension of the example above, this is likely to be realized more cost effectively on a DSL network, rather than for instance on a cable TV network.
- **Network PVR** (Personal Video recorder). Ability to record desired programs in a more or less centrally placed server, and replay the desired content at a time suitable for the consumer, is an appealing concept widely considered by many cable operators. Allowing this service on a DSL network would be relatively easy to implement.
- **Time shifted TV.** Offering the most popular programs as for instance news and sports updates for e.g. up to 24 hours after actual broadcast, independent of possible PVR functionality also installed, is yet another example of a new innovative service which quite easily could be implemented on a video on DSL network.
  An additional consideration is the fact that switched video, as seen in video over DSL and FTTx access networks, creates a lot of feedback on the audience's behavior. Unlike other free broadcast services, video on DSL requires interaction with an application server, which makes it possible to keep and maintain statistics on the behavior of the audience.

- **VoD:** Video on Demand is becoming a reality in many cable TV networks, mainly due to advances in cost efficient Gigabit Ethernet based backbone/metro network equipment. Most likely telecom operators will have to follow and add this to the video service offering, in order to compete. However, Block buster movies alone will not be the only service to consider. "Video Archive" services with access to all sorts of older movies on a pay per view basis may also be a very attractive service that DSL networks can offer as well as cable TV networks. As for cable TV networks it requires a high backbone/aggregation network capacity to be available, typically realized on low cost Gigabit Ethernet/ Dense Wavelength Division Multiplexing (DWDM) technology. This is readily available through e.g. the Prisma GbE™ platform from Scientific-Atlanta.

The Elements of a Video on DSL Network

Overview

The below drawing shows the basic architecture of a video over DSL network, with the different main functional domains outlined.



The xDSL access network connects the Network with the End user via the DSL access network. Voice and IP traffic (including video) are carried over the twisted pair infrastructure in the same access network in different parts of the spectrum. The voice part occupies the lower frequency part of the spectrum, to ensure compatibility with existing telephony equipment. At the end user, the phone connects to the DSL access network via a splitter, which combines low frequency telephony traffic with high frequency modulated data traffic. Just before the DSLAM in the network, the voice traffic is offloaded via another splitter into the Plain Old Telephone System (POTS) domain of the telco's network. The IP data (and video) continues into the DSLAM, which in turn is connected to the core/aggregation network. Typically the DSLAM itself or a router close to the DSLAM must be able to support multicasting/Internet Group Multicast Protocol (IGMP) for handling the video services, as outlined later. Internet traffic – web, mail etc. - continues through the network to the public Internet. The video specific parts of the network are located around the Headend, VoD domain, Middleware – and of course the Set Top Box (STB) at the end user.

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The Elements of a Video on DSL Network, Continued

Headend

Video content, often from already encoded satellite feeds, is acquired, descrambled and rate limited, local content is encoded and all programs sent out as MPEG-2 Single Program Transport Streams (SPTS) encapsulated in User Datagram Protocol (UDP) or Real Time Protocol (RTP)/UDP, to IP multicast addresses. (The specific details of the different headend components is covered in more detail in the following section) The core and aggregation network transports one copy of each program through the network to the DSLAMs, typically via IP over Asynchronous Transfer Mode (ATM) network and/or IP on Gigabit Ethernet.
Close to or integrated in the DSLAM resides a multicast enabled router. With the support of IGMP, this router allows a copy of the multicasted program, selected on the IP Set top box, to be streamed through the DSL network to the subscriber. Once the subscriber decides to select a new program, the IP set top box - again via IGMP - requests the DSLAM/Multicast enabled router to leave one multicast group and join a new. The time taken to switch channels is a critical element for the end user experience, and should normally not take more than maximum 1-2 seconds, the ultimate target should be a switching time about ½ second. The critical factor in this is first of all the ability of the IP Set top box to start with an MPEG-2 I frame, which is normally sent once every ~½ second, and also the speed with which the IGMP leave/join process is executed.

Middleware

In order to offer the subscriber an elegant and accessible TV service via among other an Electronic Program Guide (EPG), and in order to allow the service provider to manage provisioning/self provisioning, billing, set top box software upgrades etc., the use of middleware is required. The middleware EPG collects and represents the available services, such as accessible TV broadcast services, Video on Demand (VoD) offerings, self-provisioning options etc. A wide number of vendors offer middleware solutions; some telcos even decide to build their own middleware solution on top of the selected IP STB platform. Important considerations in the choice of middleware includes the ability to expand the middleware to cover the initial phases with e.g. a few thousand subscribers – but also ability to cover a real commercial roll out with 100.000's of subscribers, while being open and independent of proprietary links to e.g. IP Set top boxes and headend equipment.

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The Elements of a Video on DSL Network, Continued

VoD

The VoD domain can be split in true, real-time VoD, and time-shifted Near – VoD. True VoD is by far the most demanding on the network, as each individual stream of 3-4 Mbit/s has to be transmitted to one, and only one user. There are no benefits to be gained from e.g. multicasting in this scenario, as there is for broadcast services, as mentioned above. The demands on the backbone and aggregation network presented by VoD services are so high, that traditional SDH/ATM based technologies are hardly cost efficient to use for VoD. Rather, the use of dedicated Gigabit Ethernet and DWDM becomes almost mandatory to achieve a viable business case. The evolution of cost efficient Gigabit Ethernet-based VoD backbone components pushed in the recent years by e.g. Scientific-Atlanta with the Prisma GbE platform, has finally made VoD an attractive business, so far realized mainly by a range of cable TV operators.

Video Headend Considerations

Important Points to Consider for a Video on DSL Headend

The video headend must be selected with great care, and it is important to verify that the vendor is able to offer a solution where at least the following factors are taken into consideration:

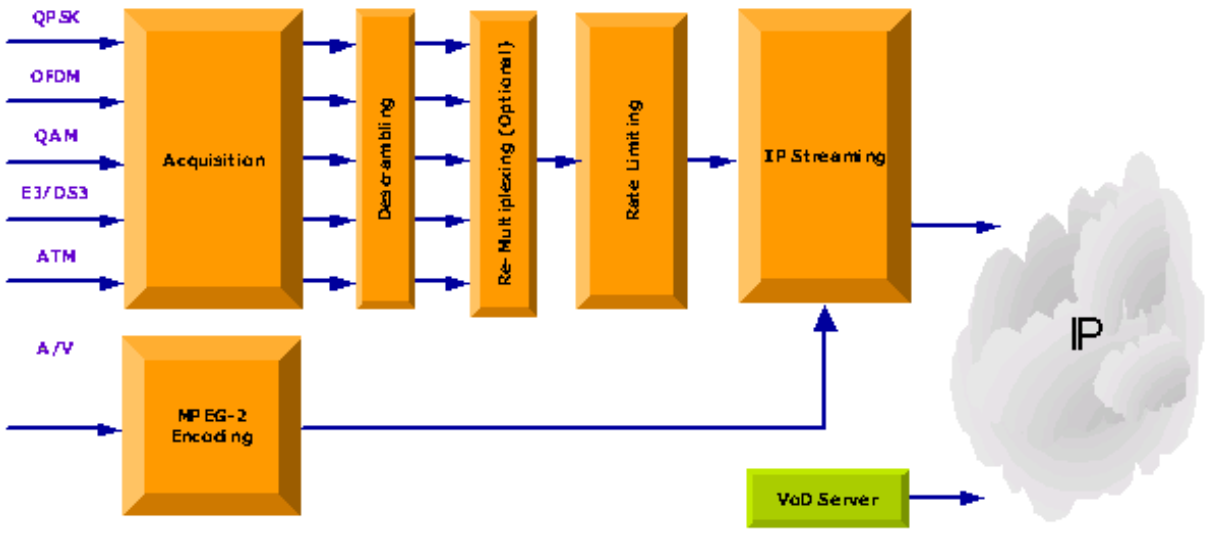
- **Scalability –** allows you to start with a small headend that can later be expanded seamlessly as the demands for a commercial roll out becomes present.
- **Powerful video processing technology** - Powerful and proven transrating technology and encoding technology that can be optimized to give superior results at low bit rates.
- **Ability to build on already proven technology –** encoders, rate compressors, gigabit Ethernet network adaptors and in reality most other headend components needed for a video on DSL headend have already been on the market for a long time and served other sectors of the video industry, as for instance the cable TV market. This industry is highly competitive, so selecting equipment that is used in other sectors of the video & broadcast market allows you to benefit from the years and years of know-how and experience, as well as the momentum and economies of scale of this market. This is valid today, and will continue to be valid in the future.
- **Flexible and open standards –** the headend should be flexible enough to ensure that you can accommodate new future needs – e.g. acquire content from DVB-T rather than satellite, change to a new encoding scheme or switch to transrating instead of re-encoding. In addition, your headend should be based on open standards, so you are able to add equipment from different vendors, without having to exchange the whole headend.

The Products in the Video on DSL Headend

Product Overview

The video headend solution from Scientific-Atlanta can be configured with a wide variety of components, and made to fit all the various levels of headend requirements. In the following, the components typically used will be discussed in more detail, and three different types of solutions will be outlined.

The picture below shows the various functions in a video headend.



Content Acquisition & Descrambling:

The standard broadcast video content for video on DSL networks is typically acquired in MPEG-2 compressed digital format from satellite or, in some cases, DVB-T networks. The Galaxy™ Subrack system from Scientific-Atlanta houses a wide variety of acquisition modules, including

- Titan MkII™ QPSK Satellite Receiver
- Atlas MkII™ DVB-T Receiver
- Spectra™ QAM Demodulator (DVB-C)
- Neon™ E3/DS-3 PDH Network Adapter
- Axis™ ATM Adapter
- Indus MKII™ Transport Stream Descrambler.
- Plus many more

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The Galaxy Subrack

With this solution you are secured a base of highly competitive and well proven standard building blocks for acquisition and descrambling, you can mix and match and expand as your requirements evolve.

Transrating

A common problem with already encoded content, coming for instance from satellite, is that the bit rate may not fit your ADSL access network. Say, your ADSL network is able to handle max. 4 Mbit/s of video, but the incoming content is at 6 Mbit/s? Or, in satellite networks, typically a multiplex filling a transponder is in a statistical multiplex, where individual services are allowed to shortly peak to 10 Mbit/s or more, although the average bit rate is only 3 or 4 Mbit/s, for instance. This is done to provide better overall picture quality in the multiplex in the satellite network… but it presents a problem in the DSL network, where you are not able to go above for instance the 4 Mbit/s.

So far the standard answer to this question has been "re-encode". Simply spoken, buy a decoder and an encoder for each program, decode it back to SDI uncompressed digital format, and encode it again to the bit rate you want.

The alternative to this is transrating. The Transis™ RateCompressor from Scientific-Atlanta is a very important product in the video over DSL Headend, as it is able to make significant rate reductions (50% or more), in a quality similar to or even better than re-encoding, virtually as good as if you had changed the bit rate of the encoder feeding the satellite link you took the signal from. This is possible with the dedicated and very high-powered transrating platform, along with the IntelliRate™ set of algorithms available for the Transis RateCompressor.

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The Transis RateCompressor.

As a result you are now able to deploy the Transis RateCompressor instead of a bank of encoders and decoders. The benefit of this is first of all dramatically lower cost – one 2 RU Transis unit is able to transrate up to 18 programs, at the cost of just a bit more than one encoder/decoder pair. Secondly you save space – re-encoding of 18 channels translates to 36 RU – the same is done with the Transis RateCompressor in 2 RU. Finally the picture quality is equal to or, in some cases, even better than what you can achieve with re-encoding. This combination is unmatched by any competing product in the MPEG-2 markets.

Encoding

MPEG-2 encoding becomes necessary for instance for encoding of local content in central or regional headends. The Continuum DVP™ Encoder Model D9030 is the newest encoder platform from Scientific-Atlanta, built on the last decade of encoding experience & know how. It is able to offer extremely good video quality at even very low bit rates. In reality, however, minimum 2-3 Mbit/s is typically used for encoded video on DSL applications, simply because the quality has to be comparable to what the cable companies offer.

The Continuum DVP Encoder Model D9030

The D9030 Encoder is a dual-pass encoder architecture, with a range of PreSightPlus™ options, offering advanced prefiltering options and allowing for optimal encoding quality, even under conditions that would stress the typical encoder found on the market. As a result, the D9030 Encoder yields highly competitive video quality at various bit rates, but the encoder truly stands out from the crowd at very low bit rates. Alternatively the Continuum DVP Encoder Model D9020 can be applied, where focus is more on keeping costs at a minimum, while still achieving very good video compression results.

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Streaming

One program at the time is typically delivered to the IP Set top box at the subscriber's premises. In order to condition the output of the video headend for this, the multiplexes coming from satellite or other sources, are split up into single program transport streams (SPTS). These streams are then encapsulated into UDP (or RTP/UDP) and multicasted onto the network, typically to routers or DSLAMs supporting IGMP, to handle channel switching requests from the IP Set top box, as already mentioned.

The Continuum DVP IP Streamer Model D9650

Initial field trials typically involve 30-40 video programs, but experience shows that 100-200 programs are often required for real commercial roll out. The Continuum DVP IP Streamer Model D9650 is available in a cost efficient entry-level version with 2 ASI inputs and 200 Mbit/s throughput capacity. At the same time it truly allows for growing, and can be upgraded simply via software, stepwise up to 8 ASI inputs and a maximum throughput capacity well in excess of 900 Mbit/s throughput – all in 1 RU – more than enough for a few hundred programs.

The D9650 IP Streamer is designed as a cost and space efficient solution, from the start leveraging on Gigabit Ethernet technology, which has been used for years in the video on IP solutions for the cable TV world.

Multiplexing

The concept of multiplexing in the traditional ASI domain is fading out in video over IP applications, as video on xDSL - the element of multiplexing moves more and more into the realm of IP and Ethernet routing and switching. There are, however, still some applications where aspects of MPEG-2 TS multiplexing can be useful to make efficient and optimized headend designs. The Pegasus™ TS Re-Multiplexer platform from Scientific-Atlanta offers all the flexibility and variety of options you can imagine from an MPEG-2 TS multiplexer, including re-multiplexing of up to 6 MPTS's, Bit rate adaptation, Dynamic PSI/SI re-generation and detailed bit rate measurement of incoming services (programs). Using the Pegasus multiplexer at the same time opens for export of DVB SI information to external systems, as for instance middleware platforms, ensuring that EPG content can be updated dynamically.

Network Management

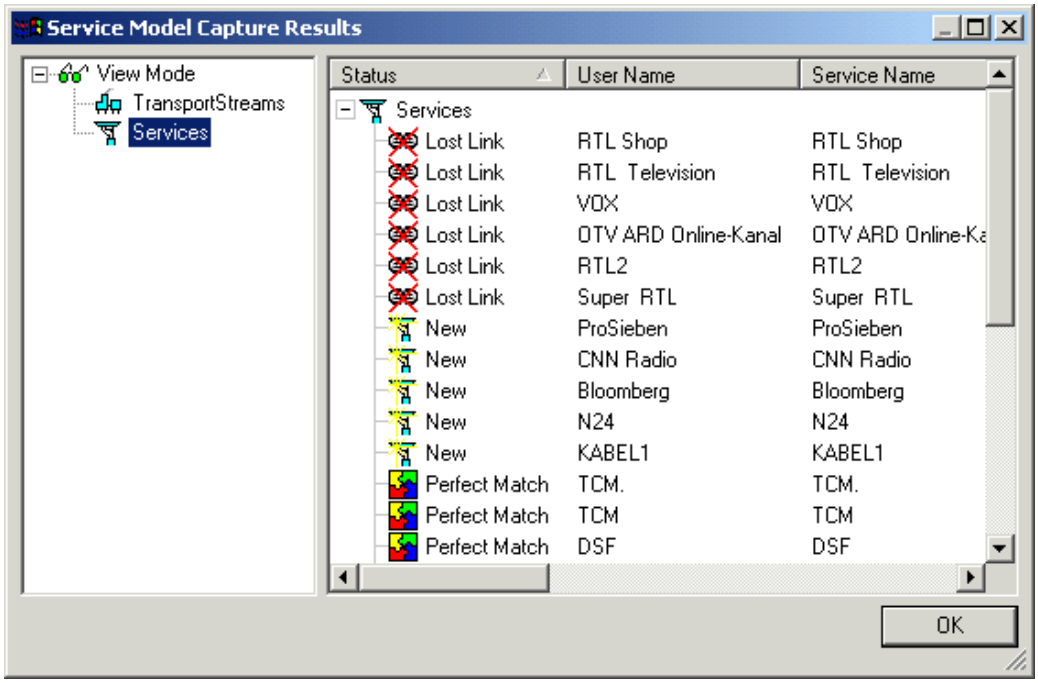
ROSA™ Management System

A strong management tool is a key factor in the day-to-day operational environment of the video on xDSL network. The Scientific-Atlanta ROSA Management System is designed to operate large as well as small-scale video networks. It offers configuration management, fault management & backup tasks, performance management and security management for headend equipment from Scientific-Atlanta, as well as 3rd party devices.

Service Management With ROSA

In addition to the classical fault, configuration and performance management, ROSA offers intelligent service management modules. The Headend Model Component software is capable of creating the inventory of services entering into the headend. With this service-modeling component, you can easily map the incoming services on multicast addresses that will be used by the streamers. In many cases, broadcast services can be configured at a high level; the software will automatically configure the required devices.

The picture below shows an overview of the incoming services that can be selected for streaming into the network. New services and services that have disappeared are indicated in a comprehensive way.



In some cases you may need a more detailed access to the configuration of the headend devices. Off-the-shelf device drivers are available for a lot of Scientific-Atlanta and third party devices.

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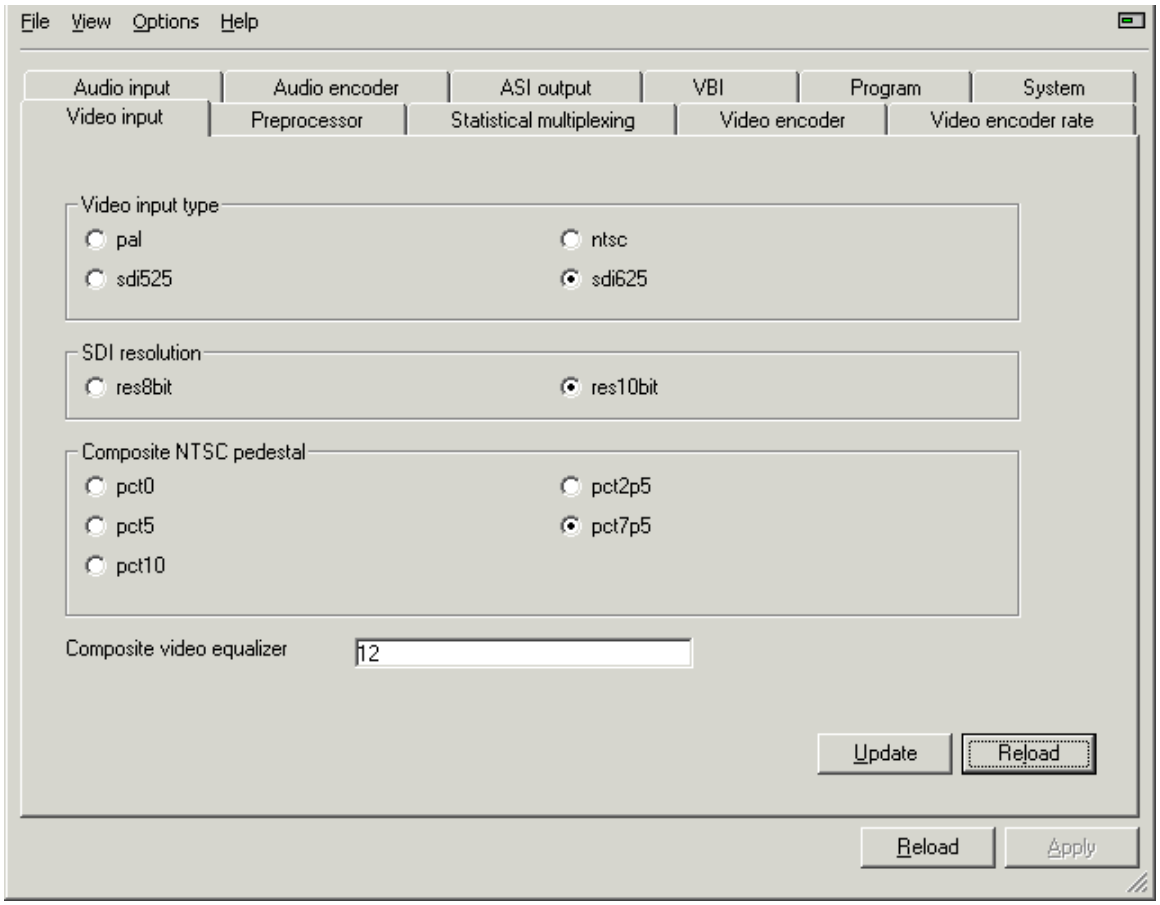
Easy Integration of 3rd Party Products

Through the ROSA SNMP profile manager and the built-in Universal Device Driver, it has become a very small effort to integrate 3rd party devices into ROSA. ROSA is able to connect to other management systems, and forward alarms etc. into the telcos' existing fault management environment.

The D9030 user interface is an example of a ROSA SNMP device driver.



ROSA Profile Managers allow you to cost effectively integrate any third party SNMP/HMS and contact closure controlled equipment (I/O) without software development.

Tailoring the Headend Solution

Step by step…

Headend solutions for DSL networks carrying video services is clearly not "just one solution". With the outlined building blocks many options exist to match and tailor a headend solution exactly to the requirements. Many different levels of headend solutions can be tailored – here are some examples:

- **The "simple and low cost" solution:** In some cases it is sufficient simply to take content from e.g. satellite and stream selected services directly out. A solution here could be as simple as equipping a Galaxy Subrack with a Titan MkII Satellite Receiver, and connect this to the Continuum DVP IP streamer Model D9650.
- **The "Rate Compressor" solution**: This solution could also go under the name "Don't let re-encoding kill your business case" – the point simply being that to change bit rates of already encoded content the until now so popular solution to re-encode is going out of fashion, as the performance of the Transis IntelliRate technology gives you equivalent results at rate reductions of 50% or more, compared to re-encoding, but at a fraction of the cost and size –as described in the previous section under "Transrating". The headend would typically consist of acquisition equipment like the Titan MkII Satellite Receiver and possibly the Indus MKII Descrambler in the Galaxy rack – then a number of Transis RateCompressors – for instance 5 units would allow rate reduction of 90 programs. This would then feed into 5 of the 8 ASI inputs of the Continuum DVP IP streamer Model D9650. If each program were 3 Mbit/s you would only have used less than 1/3rd of the capacity of the D9650 IP streamer, leaving ample room for future growth.
- **The "Encoding centric" solution**: In case the focus lies on turning non-compressed video content into a format useable in the video on DSL network, encoding is required. Depending on the requirements, the Continuum DVP Encoder Model D9020 can be the optimal solution or, if the highest performing dual pass encoding technology with advanced pre-filtering is required, the top-of-the-line Continuum DVP Encoder Model D9030 will be the right solution. The encoders simply connect to the ASI inputs of the Continuum DVP IP streamer Model D9650.

New Video Compression Methods

Overview

The compression scheme of choice in most of the video industry remains to be MPEG-2, and this will continue to be the case for several years to come for most areas. A range of new video compression schemes has emerged over the last years, promising better compression efficiency. However, in reality none of these have been widely deployed. Some of the reasons for this could be that they are proprietary standards, that the economy of scale is lacking, or that the number of independent vendors supporting it is insufficient - in contrast to MPEG-2, which was originally more or less universally embraced by equipment manufacturers and applicable to virtually all the video/broadcast industry.

The H.264 Compression Method

Perhaps the most noteworthy new technology is H.264 (also known as JVT or MPEG-4 version 10). This technology will potentially apply to most of the professional video industry, promising a non-proprietary new coding scheme with a significant bit rate reduction compared to MPEG-2. This is still a year or two out in the future, however, before price and performance-competitive commercial products are expected to be available to the market. In particular, the price of IP STBs will play a critical role for the take off of H.264 in this application.

However, it is clear that the H.264 standard is very relevant for the video on xDSL application, as it will allow more simultaneous video channels to be streamed to the household, better penetration of video services in the DSL plant due to lower bit rate requirement, and possibly offer the option of High Definition TV services on xDSL lines.

More Than Just Boxes

The Full Solution

Scientific-Atlanta offers you more than boxes. We offer you the full solution, including system design, full project responsibility, project management, service and a global organization present in all parts of the world, and virtually every country.

Wherever you are, one of Scientific-Atlanta's SciCare™ projects and solutions teams is ready to assist you with rollout and project management service and support for your digital headend deployment. We assign one project manager as your personal contact point with the team to ensure that all your needs get addressed.

Whether you require assistance with network planning and design, system integration, equipment configuration, installation, testing or staff training, the team can help. And, as standards, equipment or applications change, we constantly upgrade the teams' training to ensure you get the best possible support and service.

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+45 39 17 00 00 www.scientificatlanta.com

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