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The page features a decorative design with three blue circles of varying sizes, each composed of concentric rings in different shades of blue. These circles are connected by thin, light blue lines that form a network-like structure across the page.

IPTV Set Top Boxes Analysis

A Knowledgefaber Article on IPTV Set Top Boxes

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Objective/Scope

The document covers various aspects related to IPTV set top boxes from a telco stand point. Following are some of the key areas covered.

- CUSTOMER TRENDS & GROWTH TRAJECTORY
- CONDUCIVE MARKET FOR GROWTH
- MARKET ANALYSIS
- ARCHITECTURE
- STANDARDS
- BUNDLING STRATEGIES
- STB VENDOR CAPABILITIES
- STB VENDOR SELECTION CRITERIA
- RECOMMENDATIONS FOR OPERATORS AND VENDORS

CUSTOMER TRENDS & GROWTH TRAJECTORY

- 1) Today the end-customer wants more flexible programming environment for better interaction and advanced products like VoD and DVR. Also it has been observed that there could be a huge customer demand for integrated services like program a DVR from a cell phone.
- 2) IPTV enabler, Broadband: Broadband services industry has seen growth both in terms of consumer base as well as revenues. If we closely look at consumer broadband connections worldwide, it has risen from 85.6 million in 2003 to 442.55 million in 2009(E) and forecasted to grow 638.52 million by 2013 showing a CAGR of 22.3% Y-O-Y of which IPTV services & interactivity will play vital role. In the number of broadband connections, APAC contribution has been expected to grow from one-third of global count to half of global count by 2013. For IPTV, broadband services like DSL, ADSL & VDSL still have a major contribution compared to other modes like FTTX.
- 3) The customer appetite and likely drift towards Digital TV in the form of IPTV, Digital Cable or Satellite TV is growing by the day. The number of connection worldwide in Digital TV is expected to grow at a CAGR of 18.6%, while APAC has been growing at a much faster rate and is expected to grow at a CAGR of 33.3% during the same period. Ironically, the growth in the number of subscribers has not translated to top-line growth. Thus we see a negative growth rate in worldwide monthly Digital TV revenue per subscriber to -

5.6% CAGR owing to dropping monthly Digital TV revenue per subscriber. This is evident from average subscriber payment of 48 USD per month in 2003 going down to 36.71 USD per month presently. If we look at APAC scenario the average were 22.25 USD in Year 2003 & went to as low as 7.97 USD in Year 2008.

- 4) At the network side the growth of FTT OLT ports sold is a clear indicator of high speed data access i.e. **scaling enablers for IPTV provider**. It has risen worldwide from 79,000 in Year 2005 to 3,48, 000 in Year 2008. In FFTP ONT sales too has risen from 9,03, 000 to 5,713, 000 in same period.

FTTP OLT Port Revenue						
<i>USD Millions</i>						
	2009	2010	2011	2012	2013	CAGR
Total World (T)*	1,184.0	893.9	951.9	779.0	721.8	12.9%
Asia-Pacific (T)	734.0	537.9	612.6	470.6	468.7	24.7%
EMEA (T)	105.9	75.4	63.2	55.4	48.9	-4.9%
Latin America (T)	3.7	4.2	4.3	4.1	4.3	43.0%
North America (T)	340.4	276.5	271.8	248.9	200.0	6.6%
Total	1,184.0	893.9	951.9	779.0	721.8	4.5%

** excluded from total/average; NM = not meaningful*

CONDUCTIVE MARKET FOR GROWTH

Competitive broadband environment prevailing in countries like France and Italy and favorable LLU condition for alternative players provides scope for the growth of IPTV. Infrastructure support like FTTx has supported IPTV players like FastWeb, Lyse Tele, iVISON and B2. Lesser competitive environment from cable TV market players has acted as a catalyst in some cases for the growth of IPTV players whereas on the contrary in some cases telcos, such as Belgacom and Telefonica have implemented IPTV as direct competitive challenges to these cable TV players. Major IPTV players have Incorporated DTT capabilities in IPTV typically involving hybrid STB for the provision of on-demand applications and interactive services. Overall, the market could not be more conducive for IPTV set-top boxes growth.

MARKET ANALYSIS

The pay direct-to-home industry is characterized by two broad growth patterns: matured markets like North America and Western Europe with decaying rates and high growth/emerging markets like Asia and Eastern Europe.

Shipments of digital terrestrial and satellite set-top boxes to China, India, and the United States accounted for more than 60% of total worldwide STB shipments in 2008, and are expected to reach 70% of worldwide shipments in 2009. DTT boxes shipped to the US will account for more than 20% of global STB shipments in 2008 and 2009. DTT boxes in western Europe is expected to increase from 39 Million in 2009 to 47.9 Million by 2012, whereas IPTV is expected to increase from 10.5 Million to 17.9 Million.

Rapid expansion of the Chinese and Indian DTH platforms and analog terrestrial switch-off in the US are pushing sales of FTA satellite equipment and digital-to-analog converter boxes. **In mature markets growth will come from premium services (HD and DVR/PVR). 50% of 2009 IP set top box unit shipments in Western Europe will have hard disk drives. Among the key technology trends are improved power management and support for 3D graphics, multiple codecs, and open software platforms. The average bill of materials for an HD IP set top box will fall below \$50 in 2010.**

ARCHITECTURE

IPTV can be delivered over multiple physical infrastructures (fiber, copper or coax). Most common architectures for single family homes are Fiber-to-the-Premises (FTTP), Fiber-to-the-Curb (FTTC) and Fiber-to-the-Neighborhood (FTTN) and DSL/VDSL. Fiber-to-the-Building (FTTB) is often used in dense markets with high concentration of MDUs. Broadband wireless as an access technology is technically feasible but years from reality.

Some Major technological changes are Increased Support for digital connections, increased storage capacities, increased support for HDTV, consolidation of silicon components, Migrations to providing residential gateway capabilities, support for advanced compression technologies

IPTV middleware is the key element in developing differentiated services; Middleware vendors have developed to the point of creating SDKs; Application developers are particularly interested in working with Microsoft and other companies for access to the TV as a platform.

STANDARDS

Some of the standards defined for IPTV are:

- IPTV Linear TV Service, which includes pay-per-view and next-generation gaming.
- IPTV Consumer Domain Device Configuration Metadata, which specifies the metadata required to provide basic information needed to acquire IPTV content.
- Media Formats and Protocols for IPTV Services, which is a comprehensive listing of the protocols and media formats required for the implementation of IPTV-related services.
- IPTV Terminal Metadata Specification, which defines the data structure that facilitates the exchange of user-related data and the IPTV devices
- Fault Codes for IPTV, which includes a categorized listing of fault codes for IPTV functions and components.
- A comprehensive test plan for validating objective perceptual quality models in the context of IPTV services. The plan defines the procedure for evaluating quality models' criteria, performance, evaluation and documentation. Remote Management of Devices in the Consumer Domain for IPTV Services.
- Standard to ensure interoperability between service provider IPTV multicast applications and the network provider domain.

BUNDLING STRATEGIES

IPTV operators will struggle to sign up discrete pay-TV subscriptions. Service providers that bundle their TV offerings alongside core services such as broadband access and telephony are far more likely to attract larger numbers of new IPTV customers. Multi play customer relationship will yield greater loyalty, more up-sell opportunities and stronger ARPU potential than a single or dual-play subscription. Effective marketing strategies, combined with pricing, improved customer service, and faster and more reliable service is really becoming the boon for which telcos need to stay competitive.

STB VENDOR CAPABILITIES

Vendors in STB services for DTH, Terrestrial –DTT , Cable TV and IPTV which were traditionally mutually exclusive in terms of offerings have evolved into more of a hybrid structure supporting compatibility between multiple services, technologies like compression techniques, and management platform. If we look into the details of STBs provided by vendors we can see gamut of features embedded into them:

Ranging from interfaces support like USB dongle provided by Abilis along with single chip receiver CMOS tuner to ARION technologies providing USB compatible PVR ready directory.

Some STB vendor like Acron have expertise to have proprietary OS as a backward integration strategies, but recently the trend has changed to take the advantage of ISV's like Bit Router who develop turnkey software for STB like Cpack for NTSC (National Television System Committee) to ATSC (Advance TV system Committee) for digital TV or convertor box software for cable DTA, other compatibility features like SD and HD is looked in for vendors to provide hybrid ecosystems.

To name a few vendors in this streams are Ali, Altech UEC ,Broadcom ,Echo Star ,Eight Group , Futarque , etc. which not only provide HD and SD features but also features like integration open TV ,NDS core ,MHEG,ID Way ,multi room accessibility ,multi tuner facility ,easy remote access ,HDTV features ,Home cinema experience etc .

While some vendors like Eight Group and Futarque support futuristic MPEG 5 Fujian, HDMI features are supported by lot of the vendors like ARION technology and Eight Group.

Apart from compatibility other issues addressed by the STB vendors are management, security, scalability and add on features. Vendors have geared up themselves to come up with different strategies to meet such demand, for instance if we take Security Alibis has been offering stringent Nagra Vision NOCS 1.1 ,ADB & Altech UEC providing robust CAS suite like NDS ,Irdeto ,Nagra vision and Conax etc.

Vendors are now trying to serve customer better by developing more remote base access system. Initiative such as Echo star STB for Health problem resolution by operators, viewer management for CRM features like customer behavior, customized advertising and demographic offerings and software patches for upgrade by USB where as Fujian through RS 232 port.

2 Wire has USB expansion capability along with customized storage and external interface. It also includes software UPn P Av and DLNA technology that automatically discovers media content stored in every network device along with integrated advertising model. 2 Wire has built in set top boxes and diagnostic and reporting tools can help to decrease customer care costs, while support for pre-roll, post-roll, and overlay advertising offer revenue generating opposite With 2Wire SMS, service providers can deliver efficient subscriber service activation, account creation, authentication, billing, and near-instantaneous, on-demand content delivery.

Other vendors like Diego have content sharing capability with PC, Enseo provides the QAM/8VSB/NTSC tuner that drives their hospitality solutions, Evoc have flexible platforms support video on demand, training applications, narrowcasting, TV meetings, online games, intelligent roaming between GSM and Wi-Fi networks, voice over IP (VoIP), music, email, personal video recording and other services .

Info EQ corporation provides multiple format support enables subscribers to enjoy media server archives, surf the internet, and send e-mail. STiNO Media AG delivers customer projects in the hospitality, digital signage and healthcare markets, reduces your time to market for pilot installations or product deployment and provides the ideal platform to fulfill your customer project requirements. Sumitomo Electric Network has jointly developed with Digital Fountain, Inc. to compensate the packet loss that occurs on a best-effort type IP network. The above mentioned features are not static behavior of STB vendor space and it is seeing dynamics upgrades better customization and management capabilities.

Some other value ad have also been provided by a few STB vendors in order to differentiate themselves from the vast pool of vendors .e.g. Futarque provides DTG , Nordig C region specific offering , E Book, D book ,OSD and multi room with a house for same STB. Echo star was also able to provide similar features; Fujion provides Multilanguage OSD and parental packs as vigilance of viewing. Motorola too with its Krea TV TM has been able to provide collage of ad-on.

In just a few more years, the DVR, with its ability to record and play back any television show and skip commercials, will be a standard partner for most of televisions. Today's 2.5" HDD technology now exceeds the storage and retrieval requirements for DVR technology, while delivering a more power-friendly, quiet and space-saving design. HDD storage technology was propelled even further by the development of Perpendicular Magnetic Recording (PMR). Prior to PMR, HDDs held magnetized data bits horizontally along the media, fittingly enough called Longitudinal Magnetic Recording, or LMR.

In future PMR technology will ultimately allow densities up to 1TB per square inch. 2.5" HDD advances can allow manufacturers to offer cable companies and consumers new features, functions and designs that better serve the new digital living room.

STB VENDOR SELECTION CRITERIA

Set top box in IPTV needs to have capabilities which pass major regulatory compliance like DVB-CI slotting, finger printing and watermarking to curb IP infringement. These are just to name a few and the industry is going to witness a sea-change as the market matures in terms of volumes and geography. To add more the OEM has to be backed by robust model which meets the non deterministic or to be precise pseudo-deterministic procurement needs of the service provider. This is backed by existing customer base and manufacturing facility and supplier's agility and relationships. Experience in porting hardware and CAS plays a vital role in selection of service so forms a

Generic component of STB vendor.

The skeleton of STB is controller chipset (platform) so we need to categorically and promptly look up the features, supports, compatibility, scalability, add-ons, etc. that these vendor specific controller chipset support. The major players in this segment are ST micro, Philip, Conexant, IBM PPC, CeRoma and MPC. The integrators supports these chipset are:-

ST micro- UEC, Handar, Homecast, ADB, Humax, Kanomedia

Broadcom- TBP, IBM, Pace, Zinwell, Topfield Co. Ltd

TI- Complete Media System, Softier

Sigma- Arcadyan, Freetox SA, USD

Philips – SPL InfoTech, Techno Trend AG, Wipro Technologies

Conexant- Coship

IBM PPC- Araneo, Cerulant and Oxigen

MPC- USI

Some of the major issues pertaining to compatibility are to be checked for vendor's offerings and needs to be closely watched. This most importantly includes STB controller and followed by interface connectors like LNB input, power supply input of +12 v DC, Ethernet port, PSTN- RJ 11 port, Microphone Jack, RAM type and size, Smart Card and common interface slot i.e. DVB-CJ.

Limited and genuine right distribution is important for success for all components of IPTV value chain; it is taken care by DRM & CAS like Nagravision, Cryptoworks, Irdeto, Viaccess, Widevine, Verimatrix features. This is supported by standardized digital audio/video decoder like SD H.264, MPEG-2/MPEG-4, HDMI, 6 to 2 Channels down mixing, Stereo to Mono, Karaoke Support. The hardware features are supported by software which includes basic OS mainly Linux or embedded and only few of those that provide same RTOS. This OS further runs applications like Euroloader, Front Engine- Agfa Monotype/ Bit Stream etc. The various browser supports are ESPIAL, Opera, Oregon, Macromedia flash etc.

The value proposition for any STB vendor are inherent capabilities to support VOD features like MHP-DVR, Picture-in-Graphic, Picture in Picture, OSD (On Screen Display), PVR-trick, Play Mode, Time-shift features, independent flicker filter for graphics, Anti Aliasing, Temporal De-Interleaving motion detection and estimation, Tile and Wide Effect, Color keying, Channel Zapping Optimization, security is handled by SSL-64 or 128 bits, PKI, AES, 3DES, DVB-CSA,. Other external, supporting elements include mouse, key board, joystick, etc for gaming consoles mouse etc.

Recommendations**STB Features to look for:**

- **Standard -**
 - 1) Support for SD and HD content
 - 2) Digital media player customizable by the provider with the storage and external interface
 - 3) Parental Controls, customizable interfaces and an integrated advertising model
 - 4) CA (News - Alert) and DRM (digital rights management) Capabilities
 - 5) VOD formats- MPEG 2, MPEG 4 and VC 1, and embedded browsers
 - 6) Content sharing with PCs with limited feature
 - 7) Optional USB port enables peripherals
 - 8) Security features facilitate content protection for the system
- **Advanced –**
 - 1) DLNA technology that automatically discovers media content
 - 2) Built-in set-top box- management platform through SNMP or TR-069 and diagnostic and reporting tools
 - 3) Software customizable platform
 - 4) WiFi Digital Video Recorder
 - 5) Network Blu-ray Disc Player
 - 6) Image enhancement technology
 - 7) Innovative device like Sh@rk for home entertainment devices and the multimedia contents stored.

STB Vendor Selection Criteria (major touch points):

1. Media Frontend
2. Interfaces/ Connectors
3. DRM & CAS
4. Digital Audio & Video Decoder
5. Middleware Compatibility & Flexibility

6. Software
7. VOD & Video Capabilities

Consider - OVER THE TOP Video

There is no one single way to deliver content to all users. OTT video is beyond pure play and is clearly a trend that cannot be ignored. Although it is the content that drives consumer demand, it is the network that determines the quality of the content being delivered. Both factors are equally important when considering the total user experience. Service providers and content owners/distributors need to work together to maximize the opportunity and to guarantee a sustainable continuation of these services for consumers.

As IPTV networks are deployed and continue to gain viewers, service providers need to look at OTT video as another viable way to deliver certain types of content to consumers

OTT video could bring many networks to a grinding halt in the near future. Before this happens emphasis has to be given to following factors

- Service providers need to embrace OTT video as a valuable and secure service that can leverage their network assets and provide a differentiated service
- Service providers and content owners/distributors must establish partnerships and work together to develop effective business models that benefit everyone involved

It is anticipated that industry will experience an estimated 19% annual increase in worldwide shipments during 2010, representing an 11% annual increase in revenues over 2009. This includes all broadcast encoders serving the ingest, transcode, distribution and contribution (fixed & mobile) markets.

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