

The logo for Knowledgefaber, with 'Knowledge' in dark blue and 'faber' in green. The background features several overlapping circles in shades of blue and light blue, and thin blue lines radiating from the top left.

Knowledgefaber

IPTV in India – “Luxury for tech-savvy or a potential common man’s entertainment medium?”

A Knowledgefaber Article based on its report on
IPTV

Your knowledge partner at every step of IPTV rollout and
service provisioning. Written by Amit Goel and Gaurav Vasu ,
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respectively

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In this article the main objective is to clear certain doubts about the IPTV in general and Indian market in particular. Some of the questions that we would try to answer are:

1. Whether IPTV is really going to a big success story like mobile phones or DTH?
2. Is there enough push from the telcos/operators for the IPTV to flourish?
3. Who are the stakeholders in the market and how do they get affected by the success or failure of the market?
4. Does India have the required infrastructure for IPTV deployment?
5. War between DTH and IPTV?

It will also include certain recommendations for Telcos, Hardware providers, Software/Middleware providers

Research Methodology

Knowledgefaber researchers have been tracking the IPTV space in India and globally on an ongoing basis

Numerous Interviews (primary research) with key industry participants from Telcos, equipment providers, technology providers in India

Interviews with experts from around the world who had experience of IPTV deployments and service provisioning

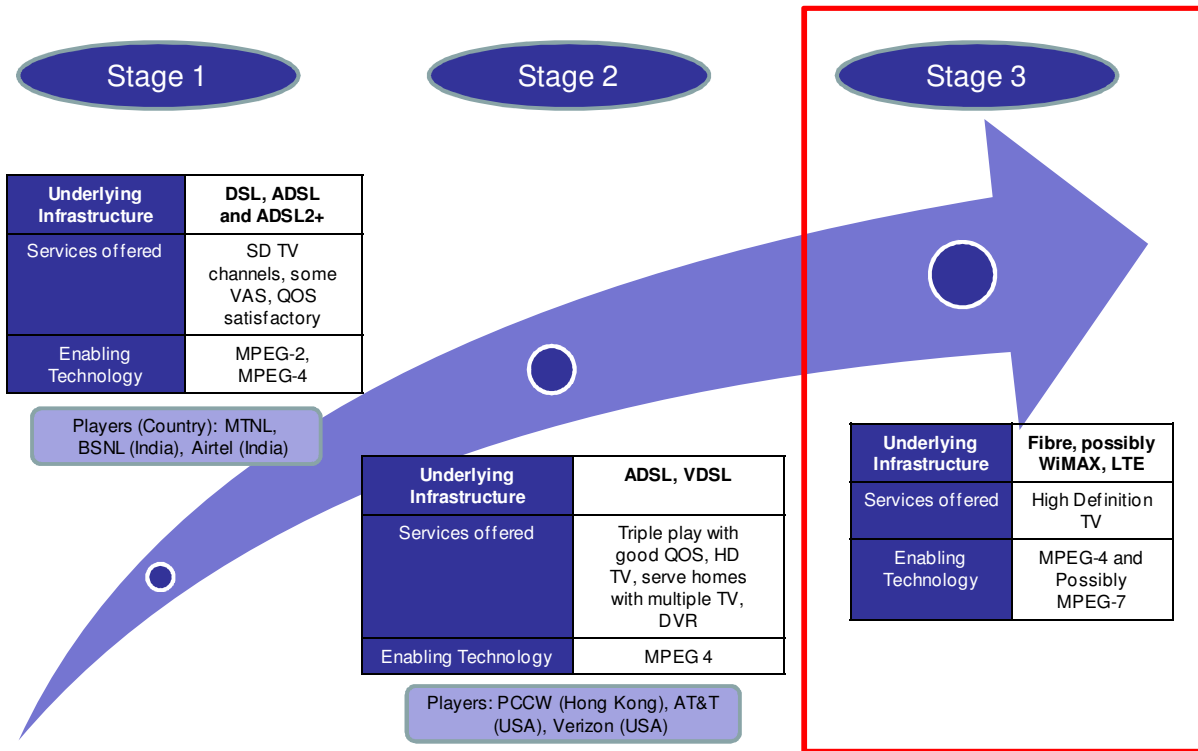
Secondary research including but not limited to annual reports, company websites, journals, magazines, literature shared by participants, web search

Introduction to IPTV

What is IPTV?

IPTV is TV-style content delivered via internet protocol directly to the consumer via a closed network – a walled garden.

Global IPTV Market Overview



Source: Knowledgefaber Internal Experts, Industry interview, Company website, News reports

Globally IPTV market has successfully reached an advanced stage (Highlighted Stage in above picture) where it has been growing rapidly since last 3 to 4 years. IPTV has grown from strength to strength from its first deployment in 1999 to 2009 in terms of numbers of subscribers and revenues. At the end of 2008 global IPTV subscriber base was 23 million grown to 26.7 million in 2009 and it is expected to grow at a CAGR of 32% to 81 million by end 2013. In terms of service revenue Global IPTV market is \$6.7 billion in 2009 and is expected to grow to \$19.9 billion by 2013 as per industry estimates. Globally there are around a hundred and twenty IPTV providers in over sixty countries, with Europe and the far eastern markets taking the top spots. Currently Hong Kong, France, Taiwan and Belgium are leading the pack in terms of IPTV penetration. By 2013, Europe and North America will generate a larger share of global revenue, due to very low ARPUs in China and India, the fastest growing (Ultimately, the biggest markets) in Asia

In the last few years major developments have taken place in the global IPTV market. One of the major development that should interest companies who are planning to foray into IPTV deployment in India, China and other emerging markets is the deployment of IPTV services over ADSL access on telephone wire or without internet connection. Operators like Deutsche Telekom (German telecoms operator) and Akash Optifibres in India are providing IPTV without internet/broadband connection. Other major milestone for IPTV was approval of a new ITU standard that supports global rollout of IPTV services. This should definitely encourage many global IPTV service

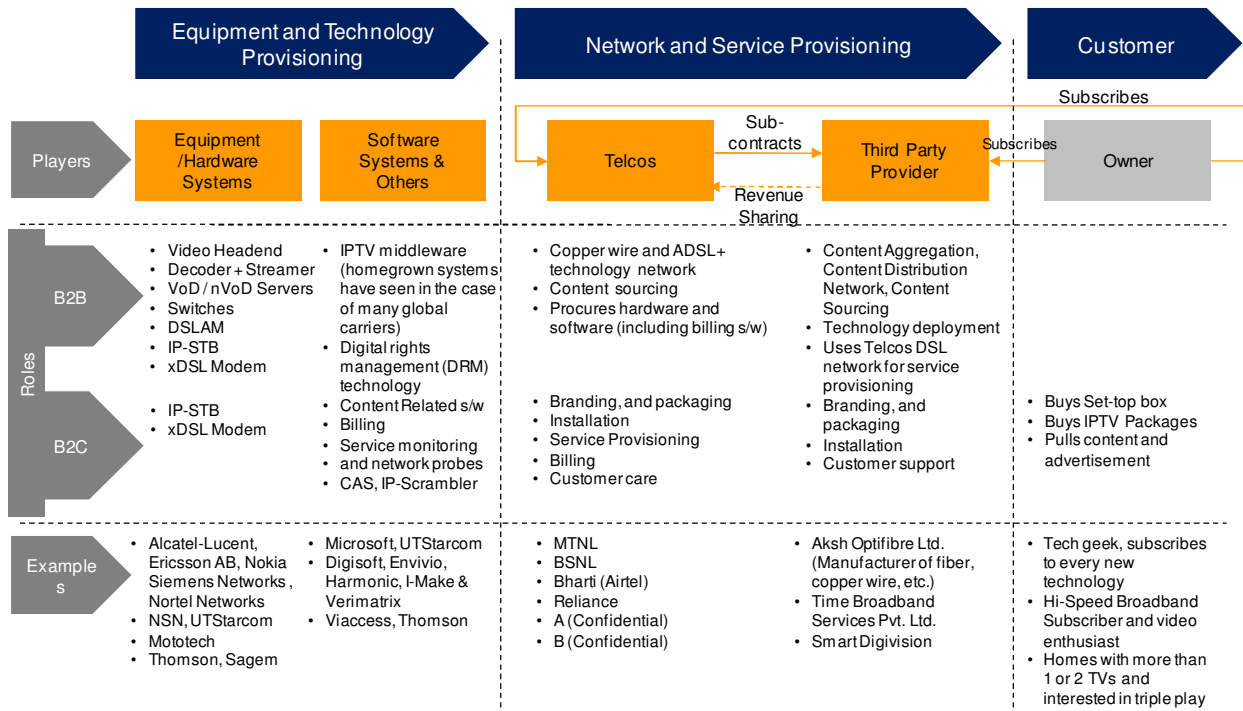
providers to look at the Indian market either to provide services directly or the cable operator route. This is another major development in the global IPTV space wherein cable operators are providing IPTV services through their existing network. Butler-Bremmer is one such recent example of leading cable operator providing IPTV services. Though examples like these are still few and far between, but cable operators abroad are starting to deliver IPTV services over Docsis 3.0, a CableLabs platform that bursts data in excess of 100 Mbit/s.

IPTV in India – Current Status

As stated we stated in our earlier report that Indian IPTV market is at a nascent stage where it is being deployed over DSL, ADSL and ADSL2+ network infrastructure owned by operators like BSNL, MTNL & Airtel. Indian market has witnessed an interesting battle where for the first time state owned companies are aggressively promoting IPTV when private players have kept a low profile. Till now state-owned telecom companies BSNL and MTNL were not considered formidable competitors to private telecom companies. But interestingly these two are aggressively marketing IPTV in India. Recently **BSNL and MTNL along with Smart Digivision (Official franchisee for IPTV) announced 'MyWay' will be launched in over 54 cities, the largest IPTV launch in the country.** Smart Digivision plans to offer IPTV services to 1.6 million to 1.7 million broadband subscribers of BSNL and MTNL in these selected 54 cities which comprise 80 per cent of the country's broadband subscriber base. Private players like Airtel and Reliance have not aggressively promoted their IPTV services. Infact Reliance has quietly launched their services in some areas in Mumbai without much fuss. While on the other hand Airtel has been going slow on IPTV, they are still in the process of evaluating more cities (Bangalore, Mumbai and Chennai) before launching aggressively. Private players believe DTH is for masses and IPTV is for the classes. However private players do realize that IPTV in the long run can become ARPU driver. Some of the other interesting developments that took place in the Indian IPTV market in the last few months was the roll out of wireless STBs (hardware essential for accessing IPTV, digital cable or DTH services) for its Internet Protocol TV (IPTV) services by Aksh Optifibre. Aksh has plans of commercially rolling out its wireless STBs for IPTV services. This will enable consumers to access IPTV services in any part of their home without having to physically make wire connections from the STB to the TV sets. Thought this is very expensive right now (three times costlier than the a normal box for accessing digital cable or a DTH, IPTV service) but we believe if this is commoditized just like mobile handsets it can penetrate throughout India creating a mass consumption drive eventually resulting in price reduction

Knowledgefaber believes that India is not only potential market for IPTV but can also become a hub for innovation and next technological breakthrough in global IPTV market. Indian IPTV market has the potential to bring new innovative technology, breakthrough business models and world class content just like the Indian wireless telecom. This is clearly evident from the amount of interest shown by biggies like Cisco, UTStarcom, CopperGate etc. UTStarcom opened their IPTV Technology Center and Center of Excellence in India to develop and enhance standards for IPTV deployments in India and support global development. CopperGate is also keenly looking at India as a huge market in the near future. CopperGate sets up one IPTV connection every seven seconds somewhere in the world.

IPTV value-chain (Existing Indian players across the value chain)



Note: To some extent IPTV related R&D work is also being done here in India by some players such as UTStarcom, NDS, etc. Sun and Tech Mahindra along with AMD have a IPTV lab at the Tech Mahindra facility in Pune
 Source: Knowledgefaber research and analysis

India's first IPTV deployment was in 2006, when MTNL rolled out its IPTV service in Mumbai followed by BSNL. Other major players like Bharti Airtel and Reliance Communications were given the go ahead to launch their IPTV services in the Indian market in Feb-2008 by TRAI. Airtel has launched its service in Jan-2009 while Reliance has quietly launched their services in Mumbai Scenario for IPTV market in India is driven by certain factors like

- Interactivity
- Value added services
- Customer-end benefit
- Fuelling broadband demand

However India still has a long way to go before IPTV can pick up momentum like wireless communication or DTH services. India has a lot of problems that exist as a barrier for growth of IPTV in India. Some of key issues are listed below

- **Physical Infrastructure** – One of the biggest challenge India faces is the required infrastructure for growth of IPTV. India lacks required high-speed wiring and copper cables and still dependent on copper or co-axial cables for deployment of IPTV network. Some parts of the world have successfully shifted to optic fibre for deploying high quality IPTV services.
- **Broadband penetration and n/w capability** – One of the biggest and most important factor for success of IPTV in any country is its infrastructure for broadband services and broadband penetration. The existing broadband infrastructure would have to be substantially upgraded, India's broadband penetration is one of the lowest in the world and success of IPTV is directly dependant on Broadband penetration. India's broadband penetration rate is 2% (Rate of internet penetration of the total households) however it is expected to pick up pace in the coming years. However advanced technologies like VDSL, WiMAX or LTE can save the day for IPTV in India.
- **Network Capability** – IPTV requires at least 1.5 Mbps line (with MPEG-4) for basic services at a good QOS and 8 Mbps line (with MPEG-4) for HDTV services. Some part of the broadband networks especially MTNL and BSNL networks are not ready yet. Most of the major cities like Delhi, Mumbai, Pune, Bangalore, Chennai, etc. are SDTV compatible this is largely due BSNL and MTNL network and these are the cities where BSNL and MTNL first launched its IPTV in India.
- **QOS (Quality of service)** – India lacks the required infrastructure to support IPTV. Current subscribers have criticized the quality of services offered by these companies
- **Content Readiness and cost** – Content is critical for success of IPTV & to compete with DTH and cable operators IPTV service providers will have to provide high quality innovative content. With respect to content there are various costs which are involved and it totally depends on what route does the player take. It can be either fixed fee deal with broadcaster or Ala carte price per channel. Operators will have to offer services that are not being already provided by their competitor including live TV, Video on Demand (VOD) and Digital Video Recorders (DVRs)
- **Cost of service for user** – The cost of IPTV services offered are quite competitive but the cost of IPTV STBS is still very high. Cost of IPTV STBS will have to fall further, as they are more expensive than traditional DTH or Cable set top boxes
- **Regulatory framework** – Some of the potential regulatory issues identified includes
 - **Advertising** – Targeted advertising and advertisement-less content delivery to allow next-generation business models
 - **Time Shifted TV** – Legal framework to support content storage, redistribution and super-distribution (e.g. access from multiple devices)
 - **Privacy** – Protect privacy of user content (with consideration for lawful intercept)
 - **Piracy** – Provide a framework for detection and prosecution. Alternate models: watermarking, crawling, etc.
 - **Multimedia Communications** – Triple play: voice, video and data regulations

- Content Classification – Larger scale production
- IPTV Ecosystem – When we dig deeper into specific infrastructure and ecosystem required for IPTV we find the following trend in India
 - IPTV Infrastructure is not at par or as required for areas like Broadband/transport infrastructure and technology, Favorable Regulations, Customer understanding of product proposition, Content readiness and cost, Unified standards development and Pricing and Promotions

Some of the key IPTV Service Providers in India include BSNL, MTNL, Bharti-Airtel and Reliance.

- **BSNL – BSNL has been offering IPTV services in over 50 cities of India, some of these includes Kolkata, Bangalore, Chennai, Ahmedabad, Gurgaon, Jaipur, Chandigarh, to smaller cities like Thiruvananthapuram, Ernakulam etc.** BSNL Kolkata started its services in Aug-07. Company is providing triple play service featuring telephone, broadband internet and TV. Additional services like pause, fast forward VOD(video on-demand). **Aksh Optifibre, Cable and optical fibre manufacturer has collaboration with state-run Bharat Sanchar Nigam Limited (BSNL) for delivery of Interactive Personalized Television (IPTV) on its broadband network in the north Indian Market.** IOL Broadband (India on Line Broadband) has a tie up with Gurgaon, Jaipur, demand) (BSNL) for Internet Protocol television (IPTV) services to Chandigarh, etc BSNL subscribers. Smart Digivision has a contract with BSNL to provide IPTV its services in Aug-07 services to its customers in 53 cities. Verimatrix, a provider of content security technology solutions for pay-TV networks, has announced that it is providing Verimatrix Video Content Authority System (VCAS) for IPTV (News - Alert) to protect IPTV services to Bharat Sanchar Nigam Limited (BSNL) customers
- **MTNL – MTNL is offering IPTV services in Mumbai and Delhi so far.** IPTV services in Delhi started in Oct-06. Triple play services including telephone, Broadband internet, and TV is provided. Video on Demand and other value added services are available. MTNL and IOL Broadband are in IPTV deal, in which IOL will provide IPTV content to broadband subscriber of MTNL. Aksh has a agreement with MTNL to provide IPTV broadband content services to MTNL subscribers in Delhi and Mumbai
- **Bharti-Airtel – In its first phase Bharti-Airtel has started providing IPTV services to customers of NCR (Delhi, Gurgaon, and Noida).** Bharti Airtel started its services in Jan-2000. Company is offering triple play advantage of telephony, broadband and TV. Company is also giving services like Video-on-Demand, Time shift TV, and interactive 2.0 (includes options like freedom of ordering pizzas and movie tickets from TV set). IBM provides software and IT requirements for Bharti Airtel' non-mobile businesses which include Direct to Home (DTH), Internet Protocol TV (IPTV), enterprise services and broadband. UTStarcom has a contract with Bharti Airtel to supply its RollingStream end-to-end IPTV solution
- **Reliance – Reliance IPTV service is currently available in select areas of Mumbai.** As per company officials it will also be made available in all major cities and towns of India soon. For a long time Reliance IPTV services of Reliance was under test. Reliance provides Triple play services and Real-time Video-on-Demand, High definition, subtitling and audio language choice, Digital video recording, etc. Reliance Communications Ltd. and Microsoft Corp. has a partnership to deliver Reliance's Internet Protocol Television (IPTV) service, which is powered by the Microsoft Mediaroom IPTV software platform

IPTV Readiness and Challenges

Is India ready for IPTV? This is one big question everyone has on their mind. Operators are aggressively promoting DTH services and not IPTV services. Based on Knowledgefaber survey's and expert interviews we sense from the

stakeholder's response that IPTV is going to take some time to gather critical mass. Based on our interviews and surveys we have gathered following facts

- Telecom players (read carriers) are not very aggressively pushing IPTV right now. They are heavily involved in their DTH service promotions.
- Companies are playing safe and waiting to see the results of IPTV launch of some of the existing companies
- Operators are waiting for the broadband infrastructure to grow and be IPTV ready

Based on Knowledgefaber expert analysis it is believed that IPTV will take some years to gain scale and will directly depend on telcos push, infrastructure and broadband penetration. Its success would depend on how seriously the top 4 telcos (with broadband infrastructure) take it up. Their involvement and creation of push would depend on the rate of return and the point of break even. Also possibility of global IPTV giant entering the Indian market cannot be ruled out. Despite low internet penetration rate of 2% it is predicated that India will have 2.5 million IPTV subscribers by 2018 with just 6% broadband penetration rate making it fourth highest in Asia.

Threat of substitutes? Question of substitute does not arise here as IPTV would have to go beyond people's imagination. "Just providing video Programs/video on demand through IPTV does not seem to be a viable business model in India since cable and DTH have already established a very large viewership base for themselves. Telcos and IPTV service providers have to come out with innovative services newer applications that can catch the attention of consumers. Unless IPTV establishes a unique selling proposition (USP), it will not be a popular choice or a substitute for DTH or Cable operators

Comparison of DTH Vs. IPTV

Parameters	DTH	IPTV
Cost for Operator	Cost per line is much lower as no requirement of a physical line to home	High cost of the DSL line and right of way permissions. Expensive hardware and software for handling the complex systems
Content Access	Content creators/broadcasters actively & aggressively pursue DTH operators to partner with them	Content creators are relatively less interested to partner with IPTV operators, and charge higher fees
Accessibility & Cost for Customers	DTH is considered most suitable for geographically large countries like the US, Brazil, India because cost of a DTH connection for customers anywhere in country is the same. Connectivity can be given even for people in remote villages	For IPTV, the cable connectivity needs to be physical drawn until the customer point, resulting in high installation charges for customers. IPTV's Access to remote customers might not be possible for many more years

Debate on SDTV and HDTV – India's current position

- Not all the available set-top boxes in India are scalable from standard definition to high definition technology. Most of the IPTV or DTH set-top boxes are just meant for SDTV. Customer has the choice to choose HD compatible set-top box and pay much more for it. In addition he needs to have high definition LCD, plasma TV, etc.

- Also one of the reasons why not many players are aggressively looking to promote IPTV services is because currently in India, TV program producers are not making programs in HD TV format.
- The price drop in HDTV in India expected, as Dish TV, Reliance Big TV and TATA sky satellite TV channel providers are having plan to start HDTV channels.
- Experts say the push to HD TV has been prompted by the government's decision that the 2010 Commonwealth Games will be broadcast only in high-definition. As a result, Doordarshan is also expected to launch HD-TV on an experimental basis, has stated it will produce content for the Commonwealth in this format.
- Sun Direct (DTH) is the only player either in DTH or IPTV or digital cable areas who is providing 'Sun Direct HD' which provides High Definition (HD) broadcast service on the DTH platform in India. It provides two HD channel in India, both are movie channel and regional languages (Tamil and Telugu).

IPTV Pricing in India

Indian market is extremely sensitive to price and to successes stakeholders will have to carefully price their services to win in a competitive environment. Currently IPTV Packages are aggressively priced infact some of the packages are at par with prices of DTH packages. However cost of STBS (Set Top Boxes) are extremely high and needs to come down drastically to attract more subscribers. This can be the potential make or break for success of IPTV in the Indian market. Knowledgefaber believes that the Indian market offers great opportunity for set top box manufacturers for long term growth. Set top box manufacturers can look at innovative design models with low cost manufacturing capabilities to support mass demand from the Indian market. Companies would have to draw inspiration from mobile/handset manufacturers like Nokia, LG, Samsung etc who churned out low cost customized devices targeted at the Indian market. Knowledgefaber expert's interviews also reveal that globally companies are trying to integrate High Definition Television (HDTV) with a built in set top box which acts as a multi compatible device that can support Cable, DTH & IPTV. One such initiative in India is taken by Aksh Optifibre which is currently testing an integrated television set in which IPTV has been integrated so that consumers do not need any extra box Knowledgefaber believes this is just a beginning of various innovative business models to push IPTV into the hands of consumer the next wave of development in highly competitive markets like India and China might bring global innovation for IPTV. Below is a snapshot of some of the available packages and pricing models for IPTV in India

Future Outlook for IPTV in India

Wireless IPTV – Knowledgefaber believes that wireless IPTV also called 'Quadruple Play' is going to be a revolution in India. Launch of 3G and WiMAX technology will bring about a huge change in the Indian market.

User Generated Content – IPTV is much beyond DTH when it comes to user generated content. Exclusivity of content and Differentiation will be key requirements for IPTV to be successful has gone beyond DTH potential to go beyond DTH when it comes to brining user Interactivity believes that wireless IPTV is going to be a revolution in India. Launch of 3G and WiMAX technology will bring about a huge change in the Indian market.

Interactivity – IPTV is all about Interactivity, services from a cable or satellite operator are "pushed" into your home. The user has limited choice and has to keep on surfing channels for variety. Cable TV is a one-way communication where as IPTV provides for a two-way communication. User has complete control over the content he wishes to view. IPTV provides range of interactive services like customised channel views, programme flow, instant content sharing (News, videos, programmes, advertisement, music etc), email, betting, games, shopping, information, Internet access and even customised advertisements. You request a program from the TV guide and the program is delivered to you. Also content providers and operators will have to come up with more innovative interactive services to capture the imagination of Indian consumers.

Also Knowledgefaber strongly feels that Windows Embedded-based solutions will enable more flexibility and versatility in offering services ranging from IP-based broadcasting to video-on-demand, IP telephony, gaming, and vertical markets such as

- Media: internal content distribution within news broadcasting, movie and video production services
- Hospitality: hotels, resorts, cruises, and luxury apartments such as Leopalace21
- Interactive point-of-sale advertising
- Education
- Corporate
- Government

Competitive Environment – IPTV is not just restricted to telecom operators globally leading cable operators have aggressively marketed IPTV services to reach out to new customer segments. Cable operators can leverage their existing cable network infrastructure, existing customer base and customer reach to offer comprehensive and high quality services at affordable prices. One of the recent example of IPTV deployment by cable operator is by Butler-Bremer Communications, which launched Cable IPTV services with Harmonic (On demand video's Direct-2 Edge solution) and Falcon IP/Complete Solutions (For "bird to box" video solution)

Recommendation for Stakeholders

Operators – Indian operators providing IPTV services have not aggressively pushed & promoted IPTV like the way they have promoted DTH. Marketing effort has been lacking to a great deal. Though BSNL has tried with live demonstration at its Kerala circle to promote IPTV in smaller cities but it has become more of evaluation strategy rather than marketing strategy. Globally operators are adopting marketing techniques like offering IPTV set-top boxes on an easy-payment basis. We believe a more focused marketing strategy would yield better results for these companies. Also we think to be successful in the long run operators will have to collaborate with content developers, content providers and VAS providers to offer unique customised customer centric content. Exclusive content, e.g., any sporting event, is another area where global operators have been able to push IPTV.

Distributors (Sales Channel) – Knowledgefaber believes that traditional sales and distribution channel may not work when it comes to IPTV and hence distributors will have to understand globally successful models followed in various industries in other competitive markets like China, Japan, Hong Kong etc and apply them to successfully sell IPTV services in India.

Equipment Providers – Indian market could be the next billion dollar opportunity for the equipment providers. Global & Indian IPTV equipment providers need to understand that the Indian market offers them a huge untapped potential. Equipment makers will have to come up with cutting edge customised STB technology to produce low cost customized set top boxes that can cater to mass Indian consumers. Equipment makers will have

to draw inspiration from mobile devices manufacturers like Nokia and to some extent healthcare device makers like GE who have learned the art of building low cost and quality products targeted at the Indian consumers. As discussed earlier a few companies like Aksh Optifibre are currently testing an integrated television set with build in IPTV compatible set top box so that consumers do not pay anything extra. These television sets can support Cable, DTH & IPTV

Consumer Behavior

Knowledgefaber has interviewed IPTV subscriber's across the country and finds that consumer reaction is very mixed. Subscribers are about the concept but we they find it difficult to differentiate between DTH and IPTV. We believe this is largely due to quality of service, lack of user generated content and high cost of digital set top boxes.

So far IPTV in India has not been able to make great impact and we suggest understanding Indian consumer needs and aggressive marketing strategy to successfully grow the IPTV subscriber base

Disclaimer: Information contained in the report has been obtained from sources deemed reliable and no representation is made as to the accuracy thereof. Neither Knowledgefaber nor its affiliates, officers, directors, employees, owners, representatives nor any of its data or content providers shall be liable for any errors or for any actions taken in reliance thereon

IMPLEMENTATION AND DEPLOYMENT CHALLENGES:

a) IMPLEMENTATION CHALLENGES

Challenges like robustness and scalability of IPTV technology. Choice of middleware platforms and video server architectures, changes in bandwidth requirements and availability and interoperability among enabling technology products are the key challenges to effectively delivering high-quality video services. The market is in its infancy and the more established commercial rollouts attracting limited take up. Growth of over-the-top (OTT) video consumption poses a particular challenge to the growth of IPTV, which shares many functional attributes with internet video—such as time shifting, interactivity and on-demand program scheduling—but which currently still relies primarily on a subscription-based revenue model.

b) DEPLOYMENT CHALLENGES

Basic deployment challenges are classified as network issues like bandwidth drop offs that have a direct effect on video quality due to copper usage , operational issues like frequently updating routing tables, bandwidth issues and network management concerns and in home issues like wiring, interference , additional CPE requirements ,post installation requirement and multiroom DVR and HDTV requirement.

COST OPTIMISATION

The cost metrics for IPTV provisioning vary significantly by provider and are based on in-home topology, the complexity of the installation and the cost of the technical workforce. The average calculated installation cost comes around Rs 287. An exception to our model is the Asia-Pacific market, where several factors lower installation costs. There are fewer wiring issues in homes because they are significantly smaller than those in North

America and Europe. Also on support side we estimate that the average technical support call lasts 17 minutes further adding to the cost.

For cost optimization DDR2 DRAM controller specification was enhanced to support transparent auto entry into an Auto-Precharge Power-Down mode (APPD) when the memory is infrequently used. This can save up to 90 percent of the power consumed by the memory devices in an idle system, with no impact to the software running on the device.

In addition to cost and size emphasis is given to reduction of capacity, power and noise. Installation of 2.5" drives serves the purpose which is one-fifth the total size, with a volume of about 67,000 mm³ and weighs just 100 grams, compared to 3.5" drives at nearly 400,000 mm³ and 710 grams. Second, 2.5" HDDs fit naturally within Green initiatives, which are now an important aspect of every technology sector using a 5V power supply, the latest 2.5" HDD consumes just .5 Watts while idle, nearly 10 times fewer Watts than a 3.5" HDD. The 2.5" HDD also operates at only 20 decibels while the typical 3.5" HDD is three times louder. Finally, 2.5" HDDs have three times the shock tolerance of their bigger counterparts.

RECOMMENDATIONS FOR OPERATORS AND VENDORS

a) OPERATOR

IPTV operators should leverage flexibility of IP platform to extend services to mobile platforms and develop effective approach for content acquisition. They should build advanced services and offer more options for bundling with other services to improve value proposition. Embrace the ascent of web-based and mobile video delivery by working IPTV into a cross-platform strategy. Use remote management to significantly reduce support costs. Take advantage of CPE visibility in consumers' homes. Operators should devise appropriate business models to harness the latent demand for premium home networking management and support services. Operators should work together with both carrier grade CPE and high-street CE vendors to promote adoption of digital home equipment and services.

b) VENDORS

Telco equipment manufacturers and CE vendors must work closely with BSPs and network operators to bring devices to market that serve the digital home needs of today and tomorrow. They should collaborate to ensure that telcos and BSP partners, as owners of the ongoing customer relationship, are able to manage and support the use of your digital home equipment. Vendors and operators should work with the standards bodies to overcome the no new wires barrier to wider digital home implementation shouldn't overlook the need for standardization of other enabling technologies.