

To

Shri. Anil Kumar Bhardwaj,

Advisor (B & CS)-II,

Telecom Regulatory Authority of India (TRAI),

Mahanagar Door Sanchar Bhawan,

J.L. Nehru Marg, (Old Minto Road) New Delhi - 110002,

Dear Sir,

In response to TRAI Consultation Paper No. 19/2019 on Interoperability of Set Top Box , IESA Broadcasting Core Interest Group would like TRAI to consider its comments attached in following pages :

About IESA

India Electronics and Semiconductor Association (IESA) is the premier industry body committed to the development of the Indian Electronics System Design and Manufacturing (ESDM) ecosystem. The IESA's vision is to bring stakeholders from the Indian industry, government and academia on a common platform to work towards making the Indian ESDM sector globally competent. The member base of IESA represent a spectrum of Large Global Corporations to Large, SME and Start-ups from Domestic Technology companies in Intelligent Electronics space, including Academic Institutions and Venture Capital firms.

IESA's vision is to bring Indian industry, governments and academia on a common platform and jointly work towards enhancing and promoting made-in-India products for world markets. IESA intends to be the 'go to' destination in Electronics and Semiconductor for Design & Manufacturing industry; be a trusted partner for Electronics and Semiconductor policy promotion for Government in the Country; be the Advisor for future skills development in the Country and be the Enabler for latest technology solution enhancing life & business while promoting technology based social innovations for the Society.

The primary objective of IESA is to act as a catalyst for the growth of the ESDM industry in India.

- Create global awareness for the Indian semiconductor and electronic systems industry outside of the generic 'IT' umbrella.
- Create a win-win interaction among semiconductor and electronics product and services companies, government, academia, venture capitalists and industry bodies.
- Create an enabling ecosystem that catalyzes industry growth and leadership.
- Enhance operational efficiency.
- Foster active collaboration between industry and universities to further expand the available world-class semiconductor talent pool.
- Identify investment opportunities.
- Drive technology vision for the semiconductor and electronic systems industry.
- Promote trade and industry.

Charter for IESA Broadcasting Core Interest Group

The Broadcasting Core Interest Group is a non-profit Indian collaboration centre for innovation in digital media technology under aegis of IESA with the purpose of looking after the digital TV marketplace in India through collaboration, bringing audio-visual innovation to Indian digital TV world. It works with all media of video delivery platforms in all modes of operation such as pay-TV, Free-to-Air, OTT, streaming etc. It embraces convergence of media technologies for all types of contents in diverse networks to focus on the efficient delivery.

The charter of Broadcasting Core Interest Group is to respond to calls from the industry, to help define and develop appropriate standards for Indian Industry which may not presently be defined under available standards and to provide a means of integrating with other DVB systems and services, whilst maintaining maximum interoperability with existing DVB broadcast standards. It will also act as a bridge between Industry and Policy making and standard mandating and regulating organizations. It may also facilitate knowledge transfer and skill development among members enabling growth of the industry. In view of the complex nature and the varied facets of such systems and services and numerous Industry stake holders dealing with this Industry, Broadcasting Core Interest Group's unique approach would be based on consensus approval between its diverse members based on commonly agreed Technical and Commercial Requirements. After successful completion of each of the standardization in India, Broadcasting Core Interest Group would approach respective standardisation body for adoption of the same in their international standard.

The Broadcasting Core Interest Group is not involved with:

1. Creation of its own Intellectual property Rights,
2. Representation of any member or any other entity to Government or any legal entity.
3. In any commercial interest or any business activity of any member or any other entity.

IESA Broadcasting Core Interest Group

IESA Broadcasting Core Interest Group had circulated TRAI Consultation paper No 19/ 2019 to all its members and further circulated the comments received from the members. After group discussion among the members comprehensive collective response from the group is being detailed below. Following Group members have given comments:

1. Broadcom: Semiconductor Provider (SOC)
2. Tata Elxsi : System Integrator & STB Designer (SI)
3. Commscope / Arris / LATENS : International CAS provider (CAS)
4. Intertrust : International CAS provider (CAS)
5. Creative Insight : Independent Consulting Firm to STB Manufacturers (IC)
6. CDAC : Scientific Society (SS)
7. Ali Tech : Semiconductor Provider (SOC)
8. L&T Technical Services: System Integrator & STB Designer (SI)
9. Mediatek (SOC)

Following members have participated in the group discussions

1. Broadcom: Semiconductor Provider (SOC)
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7. Ali Tech : Semiconductor Provider (SOC)
8. L&T Technical Services: System Integrator & STB Designer (SI)
9. Kudleski/Nagra/Conax: International CAS provider (CAS)
10. ByDesign :Indian CAS provider (CAS)
11. Safeview : Indian CAS provider (CAS)
12. Square A Analytic & Consultancy: Independent Consulting Firm for Broadcasting(IC)
13. IESA

The initial comments from the stakeholders after going through the consultation paper varied according to individual stakeholder's function and position on the issue. In the following pages individual responses of the stakeholders have been given. These comments have been discussed within the group during the group discussion and collective response after group discussion has been added in the end.

Regards

Ankan Biswas
Chair,
IESA Broadcasting Core Interest Group,
India Electronics & Semiconductor Association
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Attached: Response to Consultation paper 19/2019 on Interoperability of Set Top Box (page 4 to 24)

Response to Consultation paper 19/2019 on Interoperability of Set Top Box

TRAI Q1.

In view of the implications of non-interoperability, is it desirable to have interoperability of `STBs? Please provide reasoning for your comment.

Individual initial comments of the Group members:

SSx: Yes, it is desirable. The customer should always have an option to choose the service provider. Switching a service provider results in a unused set top box which generates e-Waste.

Slx : Yes, going forward new STBs that are getting deployed it is desirable to make them interoperable. This will help to reduce e-Waste and also consumers get benefitted in terms of choice in the service that suits him

CASx : An appropriate group of entities needs to convene and decide what is meant by “ interoperability across STBs”. A certain level of interoperability in specific areas is crucial to reduce overall ecosystem cost. That is, for STB manufacturers to use standard components - e.g., Trusted Execution Environment (TEE), secure outputs (e.g., HDCP), support for DASH + CENC , DVB-CSA, DVB simulcrypt and other DRM/CAS-specific elements, and middleware standards such as HbbTV - will allow the STB manufacturer to focus on improvements to the user interface and other user-friendly design. This will benefit consumers from the perspective of affordability and quality of service. Focusing on interoperability in the area of box physical design and efficient energy usage can also extend the device lifecycle and help reduce electronic waste, thereby providing support for a cleaner environment. A strong interoperability strategy should be applied to all consumer devices, including Smart TVs and STBs.

In the case of Smart TVs, which may virtually eliminate the need for STBs as well as old security technology such as Smart cards, we expect there to be further benefits for consumers and the environment.

A certain level of interoperability in specific areas is crucial to progress towards Interoperability. That is, for STB manufacturers to use standard components - e.g., Trusted Execution Environment (TEE), secure outputs (e.g., HDCP), support for DASH + CENC , DVB-CSA, DVB simulcrypt and middleware standards such as HbbTV.

In the case of Smart TVs, which may virtually eliminate the need for STBs as well as old security technology such as Smart cards, we expect there to be further benefits for consumers and the environment

Sly: Interoperability is good for consumer/Subscriber, so subscriber can switch easily from one operator to another operator without changing Consumer device CPE/STB. However, it is very important to look at the following for implementation.

1. What will happen to Investments so far on STB's
2. E-wastage on unused legacy STBs while introducing interoperable STB's

3. Operator may need to invest some more investment on Headend/Backend system bringing Interoperability.
4. May be required to create Opensource Community like RDK in USA for Video Platform Interoperability to bring Broadcasters, DPOs, MSO's, SoC's. OEMs, CAS/DRM and Headend Platform providers. It will take time to bring all of them to one page and invest to create New innovative solution. Who will invest and lead the same?
5. vSTB could be one solution to bring interoperability, many of the main STB function to move to cloud, where Operators need to invest on Platform migration/upgradation to support the Cloud platform. This will reduce STB cost further down or null.
6. Need to consider Next Generation Platform technologies OTT/Multiscreen, Immersive Reality Content and 5G while taking decision. Need to think more beyond available platforms today in India with future roadmap.
7. OTT Players are competing with Cable, DTH conventional platforms, what will be Interoperability with these forward compatibilities with legacy platforms.
8. Phased manner approach could be one possible solution rather proposing big shift.

SOC x : We need to see what interoperability brings. If we talk about content, most Cable /DTH operators are giving similar content, so that is not the reason.

Additionally, the general market has gravitated towards OTT (phone and device) and IP based devices. These devices are currently providing a platform for aggregating content from different content providers, and hence can be considered interoperable on content.

In this new era, a cable or DTH STB, being interoperable is desirable but without any feature reduction, so as to compete with the newer devices. Interoperability would be desirable as long as feature sets like enhanced graphics, HD, 4K etc. ,are not compromised.

ICx : Interoperability must be first implemented within the platform. This will result in consumer moving to the competitive operators and best service, resulting in higher scale and revenue level. It will also stimulate the regime of value added services being offered by operators, thereby increasing the ARPU. This will help in offering better quality and feature rich boxes to the consumers as an upgrade, there by bringing in the possibility of including additional BOM cost for interoperability function.

SOCy : The interoperability of FTA STBs is much easier than the STBs with CAS because there are a lot of proprietary of each CAS vendors. If the first stage of interoperability could be applied on the FTA STB, we can check if the effects are achieved after first stage. Then, deciding the second stage of the interoperability of CAS could go or not

CASy: As a CAS solution provider, we do not advocate lock in of service providers or their STBs to our CAS solution. In cases where a service provider wishes to implement and invests in multi CAS solution, we have been supportive of this. Interoperability as described in this consultation, enabling

customers to move STBs between service providers will bring additional cost to products, operation and maintenance which need first understood and weighed versus any benefits.

SOcz: In Pay-tv industry, the content protection is the key to make sure the Pay-tv industry could continue to grow and development. The standard should be accepted by industry led body in content protection regulation and CAS vendors. They are the experts and pay a lot of effort to avoid anti-piracy. From SoC viewpoint, We will follow CAS vendor's security certificate requirements on hardware and firmware parts.

IESA Broadcasting Core Interest Group Collective Response after group discussion:

Yes. Simple answer is Interoperability of STBs is desirable to have.

However, devil is in the detail. Interoperability means different things to different stakeholders. What is expected by the 'Interoperability' must be defined. An appropriate group of entities needs to convene and decide the detailed functionality of "inter-operability across STBs", which would be acceptable across the eco system.

Integral cost of interoperability in terms of Interoperability cost on the consumer, operator and other stakeholders, i.e. 'Total cost for the eco system' for attaining interoperability need to be estimated. Indeed there would be some incremental cost for changeover from 'Lock in' system to 'interoperable system'. However there would be a huge cost advantage also. The cost advantage for the eco system through 'economy of scale' of design and manufacture of the interoperable STBs and cost reduction through elimination of unnecessary sub-optimal repetitive work for small quantities in individual bespoke developments and implementations for each of the proprietary element in the ecosystem whether for design or individual implementation for each CAS /operator/middleware combination must also be considered.

Consumers do willingly pay more for new functionality and better quality, not higher cost of the device for same functionality. Subscribers did pay more for HD STB than SD STB. While deciding on the interoperability one needs to think beyond platforms and services available in India today and keep in view of future roadmap of broadcasting. OTT and multi screens applications have arrived and the change in design from legacy STB to new functionalities are already evident today. It is mandatory that while considering interoperability standard these new applications should be kept in full view with understanding of Next Generation Platform technologies OTT/Multiscreen, Immersive Reality Content and 5G.

It would be a good idea to create Open-source Community like RDK in USA for Video Platform Interoperability to bring Broadcasters, DPOs, MSO's, SoC's. OEMs, CAS/DRM and Headend Platform providers.

The other issue of STB getting integrated into smart TV has been considered for long time anticipating end of STB, which did not happen yet and according to forecast of Indian TV Industry, market share of Smart TVs would not become significant in foreseeable future. Anyhow as the interoperability has more chance of being implemented through software, the same process of interoperability would also be available for Smart TVs with built in STB functionality (as in the case of DVB CI CAM module, which was used by both STB and TV)

TRAI Q2.

Looking at the similar structure of STB in cable and DTH segment, with difference only in the channel modulation and frequency range, would it be desirable to have universal interoperability i.e. same STB to be usable on both DTH or Cable platform? Or should there be a policy/ regulation to implement interoperability only within a platform, i.e. within the DTH network and within the Cable TV segment? Please provide your comment with detailed justifications.

Individual initial comments of the Group members:

SSx: .

Yes, it is desirable. The tuner part should be kept separate & should be detachable to enable the consumer to switch from cable to DTH or vice versa. Also the cost of the tuner should be affordable. Presently the CAS implementation are proprietary, so the CAS also needs to be changed. This is trivial; as there should not be any hard mask program in the box. Presently the STB follows the ETSI standards & getting compliance will be a time taking process. The STB SoC follows the 3 layer key ladder ETSI TS 103-162 standard & smart card also uses keys which will not be easy to reconfigure. So the downloadable CAS or any other futuristic solution whichever will be proved later can be adopted. Here the emphasis is the CAS must be soft configured & there must be some mechanism to reload the new CAS by the service provider/operator. This solution needs to full-proof and commercially viable.

But at least, if the service provider is same, then switching from cable to DTH or vice versa will be doable with a detachable tuner. The decoder part of the STB will always give descrambled data. The in between hardware (descrambler, Soc/smart card) should not restrict the new CAS in its functioning.

SIx : Yes, as the difference is only FE, rest of the platform should be reusable

CASx : We believe the industry will go through consolidation for content distribution channels and more operators will opt for a hybrid strategy with both IP based video streaming and DVB based signal broadcasting. Consumers and Operators should not need to make a choice between cable, IP or Satellite / Cable as all they want is to consume the content whenever and wherever they want. Ideally, consumers should not have to think about the source of their content, whether broadcast or over the top. Content discovery applications should be able to take advantage of a variety of standards, including Hybrid Broadcast Broadband TV (HbbTV) to hide the associated complexity.

The real challenge will be for STBs to support different frequencies and modulation, features for which regulators and policymakers will need to be involved.

It may be advisable to consider CAS solution that uses cloud architecture at the backend side with software based clients on STBs/TVs. This may benefit the industry

Sly: We believe Interoperability should implement in phased manner within the platform (DTH or Cable). This approach could be having less impact and modification are required in STB @ Conditional access layer and corresponding authentication process. Platform level Interoperability is also possible but this could be major change in STB which increases the Cost of the STB as you must have separate frontend Module/Tuner Circuit for Cable and Satellite other than Conditional Access Module. These days, DPO operators also introducing OTT services using Hybrid STB's. In this

scenario, Internet is must to receive OTT services through ethernet or WIFI. Service authentication can be shift to Cloud on token exchange for each service enablement similar like OTT Video service for traditional Video services though Internet, where there is decent investment is required for Operator for upgradation of their Headend. This way Hybrid STB's @ individual platform level interoperability can be implemented.

SOcx : No. There is currently no SoC support for a single SoC to support both Cable and DTH markets. Using the same STB for both cable and satellite would imply an increased cost, as the STB will need to have both cable and DTH SoCs and related hardware (for example Cable does not require LNB circuitry etc). Even though DTH and cable differ in modulation and coding, the difference in SoC cost in implementing on a single silicon is quite high due to the cost of having two parallel demodulators, one for each. This cost will need to be borne by the end consumer and is hence detrimental to providing an affordable solution.

ICx : Interoperability must be first implemented within the platform. This will result in consumer moving to the competitive operators and best service, resulting in higher scale and revenue level. It will also stimulate the regime of value added services being offered by operators, thereby increasing the ARPU. This will help in offering better quality and feature rich boxes to the consumers as an upgrade, there by bringing in the possibility of including additional BOM cost for interoperability function.

Icy: Universal interoperability is required. By considering the following two scenarios the issues would be clear:

Scenario A:

Universal interoperability is implemented and it is expected that a customer would be able to shift:

1. from a DTH service to a Cable service
2. from a Cable service to a DTH service
3. from one DTH service to another DTH service
4. from one cable operator to another cable operator.

But in reality under this scenario, 1st, 2nd and 3rd shifts would be possible but 4th Shift would not be possible for the same household as two cable operators are not serving the same household.

Scenario B:

Interoperability within the platform is implemented and it is expected that a customer would be able to shift:

1. from one DTH service to another DTH service
2. from one cable operator to another cable operator.

But in reality under this scenario, 1st shift would be possible but 2nd Shift would not be possible form the same household as two cable operators are not serving the same household.

This would mean that implementation of interoperability STB within a platform would offer nothing to Cable TV STB owner through Scenario B

Hence universal interoperability is required for reaching some benefits of interoperability to cable TV subscribers and regulator must address the issue of “right of way” so that more than one Cable TV operator is able to serve the same household, in the similar way as two electricity distribution company is able to serve the same household in India today and customer can shift.

SOCy :

The specifications of DVB-S and DVB-C exist and have been applied for decades of years. When they are designed, the different considerations of use cases should have been discussed. QAM is used for DVB-C and QPSK/8PSK are used for DVB-S. That is why they are diverse. The different frequency range makes STBs support both DVB-S and DVB-C at the same time. If they become universal interoperability, these different considerations will be ignored. Now, there are some tuners can support multi-demodulations in one tuner/demod. STBs with these kind of tuners can support both DVB-S and DVB-C.

SOCz: The policy/regulation to implement interoperability only within a platform should be reasonable. It could avoid device cost increasing by different hardware modulations and reduce the procedure cost.

IESA Broadcasting Core Interest Group Collective Response after group discussion:

It is desirable to have universal interoperability, which will offer the subscriber to shift from one DTH service to another DTH service, from a DTH service to a Cable service and from a Cable service to a DTH service

Interoperability within a platform would only offer Satellite subscribers interoperability between one DTH service to another, but Cable TV subscriber would not be able to shift from one cable operator to another cable operator, as one household is physically served by only a single cable TV operator today. Hence Interoperability within the platform does not provide interoperability to Cable TV subscriber on the ground. The situation would only change when more than one cable operator serve same household.

The technical solution of universal interoperability simply requires ability to select front ends within the STB between DVB S and DVB C (change in Demodulator). This would need STB to be designed to support both DVB-S and DVB-C.

Multi-demodulations tuners which can support both DVB-S and DVB-C are available. As there is no implementation of dual front end STB in market today and single SOC required supporting both Cable and DTH is currently not available. The cost of such STB are expected to be higher than Cable STB as a Cable STB does not require LNB related circuitry.

TRAI Q3.

Should interoperable STBs be made available through open market only to exploit benefits of commoditization of the device? Please elaborate.

Individual initial comments of the Group members:

SSx: With the above solution it is possible to go through the open market

SIx : In addition to commoditization interoperable STB provide a choice for the consumer to select the right product for him and will create a healthy competition to bring compelling products into the market.

CASx : A sound, standards based, interoperability strategy should be applied for all video distribution and access devices made available to consumers, especially Smart TVs, thereby empowering consumers with more choices. Such a strategy should always take into account the importance of incentivizing device makers to innovate and differentiate

Sly: Today Services Provides are providing or made available STB's either on rental model or subsidize the STB cost to subscribers. They know their Customer very well and it is very easy to seed or penetrate the boxes in market. An alternative "open market" way of selling the boxes may not offer subsidize STB cost. We believe that it is possible STBs made available through open market with the above suggested various solution. However, Operators may find their own way to distribute the STBs through their channel distribution in initial phase. Open market will develop in subsequently bring the competition between OEM vendors in pricing and features list once Interoperability deployment is stable in the Industry.

ICy: Operators have been subsidizing the STBs to subscribers to seed or penetrate market. Though it had worked well for initial deployment, the subsidy cost is sitting in their books of account and limiting their ability to deploy newer functionality of service requiring upgrading of STBs. An "open market" STB will allow the customers to select STBs of their choice and relieve the operators of their financial burden of seeding. The commoditisation of STB will bring in larger Consumer Electronics brands into STB market.

ICx : Today STB market is open enough for consumers to select their preferred service provider and equipment. Higher and increasing penetration of boxes indicate that the point of purchase / channels are ample in numbers for consumers, there is no need to create an alternative "open market" way of selling the boxes. STB is already considered a commodity and near zero margin business by manufacturers and operators alike.

SOC x : If the STB is truly interoperable then open market will facilitate commoditization. Making this the only reason does not make a strong point. The more reasons for interoperability would be customer satisfaction with more choices of content from different operators, which is not the case today.

SOCz: If there is the standard and we talk about the basic and common market like as zapper, it may bring the benefit of commoditization of the device. But we also consider that the operators provide Pay-tv service with STB. If the operators want to provide the special service, the interoperability STB device may counter the function limitation problems.

SOCy : A well defined specification can help the product become a commodity faster. Once it is a commodity, only the price is the most important consideration of manufactures.

IESA Broadcasting Core Interest Group Collective Response after group discussion:

Operators have been subsidizing the STBs to subscribers to seed or penetrate market. Though it had worked well for initial deployment, the subsidy cost is sitting in their books of account and limiting their ability to deploy newer functionality of service requiring upgrading of STBs. An "open market"

STB will allow the customers to select STBs of their choice and relieve the operators of their financial burden of seeding. However, Operators may find their own way to distribute the STBs through their channel distribution in initial phase. Open market will develop in subsequently bring the competition between OEM vendors in pricing and features list once Interoperability deployment is stable in the Industry. The commoditisation of STB will bring in larger Consumer Electronics brands into STB market. In addition to commoditization interoperable STB provide a choice for the consumer to select the right product for him and will create a healthy competition to bring compelling products into the market

A sound, standards based, interoperability strategy should be applied for all video distribution and access devices made available to consumers, especially STB and Smart TVs, thereby empowering consumers with more choices. Such a strategy should always take into account the importance of incentivizing device makers to innovate and differentiate

TRAI Q4.

Do you think that introducing STB interoperability is absolutely necessary with a view to reduce environmental impact caused by e-waste generated by non-interoperability of STBs?

Individual initial comments of the Group members:

SSx: Yes. It will be helpful. There is a e-waste policy controlled through Ministry of Electronics & IT. The mobile phones, laptops, PC and many others electronic items can't be dumped to a scrap vendor or sold. This is already under practice.

Slx : Yes, if it is not controlled it will continue to grow

ICy : STB should be included in the schedule I of e-Waste Rule, so that the responsibility and liability of the e-Waste also applies to STB, and operators deploying the STB, its manufacturer, assemblers and importers are hold responsible at par with manufacturers of other electronic products which are in the schedule. As set top Box is not sold through the Electronics product distribution chain, the current rules of are not directly applicable or suitable way to assign the e-Waste responsibility. The e-Waste rules should be modified in such a way that even if the STBs are not sold and shown as operator's property, the same rules should apply.

The more important issue is that though the life span of a STB is much longer than other electronic devices like Mobile Phone, PC etc, the STB is not fully used for its designed life, because it is not inter operable from one operator to another, which does not happen for mobile and PCs and TVs are used as second hand to extract its full useful life. Implementation of Interoperability would indeed improve the e-waste situation for STB by second hand usages of STB as it happens in other electronics commodity.

The other important aspect which must be taken care that implementation of interoperability should not create a situation that currently deployed STBs become unusable.

CASx : In general, focusing on interoperability in the area of box physical design and efficient energy usage, using a standards based approach, can future proof the device, extend the device lifecycle and help reduce electronic waste, thereby providing support for a cleaner environment. Also,

encapsulating functionality that has in the past required a separate STB directly into the Smart TV, will eliminate the e-waste of Set Top Boxes all together, and having a standard that is future proof and can be implemented in TVs is critical. We believe the best way to reduce E-Waste is to eliminate the need of STB and CAM modules with direct embedded security inside TV and provide ability for operators to build on top. That is, fewer boxes reduces e-waste.

Sly: We don't think that reduction of e-waste will happen with interoperability introduction in coming days. What do we do with the current deployed STB's after Interoperable STB's. It is itself create huge e-wastage. There is an e-waste policy exist in India and which is controlled through Ministry of Electronics & IT. The mobile phones, laptops, PC and many others electronic items can't be dumped to a scrap vendor or sold. Need to apply the same policy for STB's. For e-waste reduction, proper mechanisms to be created to collect, aggregate and recycle e-waste.

SOC x : STB interoperability will definitely help environmental impact. For example the OTT devices that play content from many sources may have a longer shelf life as the need to change is not necessary. The software upgrades allow new content to be accessed from different content providers.

ICx : For reduction of e-waste, interoperability is not a necessary and sufficient condition. STBs are considered to be a long life equipment in a home, much more than Mobile Phone, Accessories etc. For e-waste reduction, proper mechanisms to be created to collect, aggregate and recycle e-waste. Without establishing those frameworks, just focusing interoperability as a way to reduce e-waste is not a prudent decision to do.

SOCy : Do not think STB interoperability will reduce e-waste of non-interoperability of STBs. Let's think about PCs and notebooks. PCs and notebooks are the most interoperable products, but they will become e-waste in few years later once a new generation appears. Generally speaking, users do not like using old products of slow reaction after they already know there are new products of faster reaction

CASy: E-waste could be reduced in other ways such as return of STBs to service providers where they could be re-used. Our CAS solution enables STBs to be re-provisioned.

SOCz: If we talk about the basic and common market like as zapper, it should reduce the e-waste situation. In the high-end market, the operators provides the premium services with the non-interoperability STB to bring the friendly user experience. Currently, more and more operators tend to refurbish old STBs that retrieved from unsubscribed users, not to keep building new boxes.

IESA Broadcasting Core Interest Group Collective Response after group discussion:

Implementation of STB interoperability will be helpful reduce environmental impact caused by e-waste generated by non-interoperability of STBs.

There is an e-waste policy, controlled through Ministry of Electronics & IT, for mobile phones, laptops, PC and many others electronic items, which is already under practice. STB should be included in the schedule I of E Waste Rule, so that the responsibility and liability towards the generated e-Waste also applies to STB, and operators deploying the STB, its manufacturer, assemblers and importers are hold responsible at par with manufacturers of other electronic products which are in the schedule. As set top Box is not sold through the Electronics product distribution chain, the current rules of e-waste

policy are not directly applicable or suitable way to assign the e-Waste responsibility. The e-waste rules should be modified in such a way that even if the STBs are not sold and shown as operators property, the same rules should apply.

The more important issue is that though the life span of a STB is much longer than other electronic devices like Mobile Phone, PC etc, the STB is not fully used for its designed life , because it is not inter operable from one operator to another. This phenomenon does not happen for mobile and PCs and TVs. Those devices are used by other users as second hand to extract its useful life. Implementation of Interoperability would indeed improve the e-waste situation for STB. by second hand usages of STB as it happens in other electronics commodity.

Focusing on interoperability in the area of box physical design and efficient energy usage, using a standards based approach, can future proof the device, extend the device lifecycle and help reduce electronic waste, thereby providing support for a cleaner environment.

The other important aspect which must be taken care that implementation of interoperability should not create a situation that currently deployed STBs become unusable, which indeed will create more e-waste.

TRAI Q5.

Is non-interoperability of STBs proving to be a hindrance in perfect competition in distribution of broadcasting services? Give your comments with justification.

Individual initial comments of the Group members:

SSx: Yes, CAS is a vertical driven market and set top box is the last element (CPE). It is designed to be non interoperable to sustain in the market. So, for these obvious business reasons, the CAS vendor, MSO & STB manufacturers will have hesitation. But in the larger interest of the consumer and a perfect competition, the interoperability is required.

Six : As this will lock the consumer to specific operator and his services only

CASx : We need to be clear about the specifics of interoperability. Use of completely proprietary STBs that are designed to work only with one operator, creates a walled garden for that operator. The walled garden effect may require consumers to use different boxes for different operators, is generally not consumer friendly. If the industry works together to consider the aspects of interoperability that will provide a better consumer experience while at the same time enabling new types of innovative services, all participants in the content distribution value chain will see the benefits. Combined with triple play, appropriate points of interoperability provide additional advantages to the network operators to offer services beyond content broadcasting.

Sly: We don't think Non-interoperability is hindering competition. There is huge competition among the operators hence we have very less ARPU in India comparatively with world Market. Subscribers also can move one Operator to another operator with minimum STB investment. The only one major problem is e-Wastage during churn of the Customer. This must be controlled bringing very strong policy of reusing the asset with refurbish CPE.

SOC x : We do not think non-interoperability is hindering competition as operators are fighting each other based on features and services. In fact, if interoperability means reduced features, that might hinder competition and in turn reduce feature sets.

ICx : No, India market has good enough competitive forces. If additional competition is needed, more players mainly operators have to be brought into the ecosystem who will bring better services and richer content as well as bring in state of the art business models. Interoperability within the specific platform e.g. Within Cable, Within DTH, is necessary, to ensure that consumer has a choice.

CASy: No response

SOCz: STB interoperability could let STB device maker join the market easily, but it should not be the key hindrance in Pay-tv industry. Broadcasting service is the key to attracting the subscribers. Services. Operator/CAS/Device maker can sure their invest can bond with the end-users tightly, which make them more willing to keep doing innovation and differentiation, and it is innovation and differentiation nourishing competition? Reducing anti-piracy situation to establish the normal profit module could make Pay-tv grow and develop healthily.

IESA Broadcasting Core Interest Group Collective Response after group discussion:

Perfect competition is an abstract concept. There is definitely competition in distribution of broadcasting services today in India. The fact that there is competition among the operators is evident by the level of ARPU in India compared to prevailing APRU in the world Market.

To answer the question whether non-interoperability is hindering competition, we have to ascertain if operators are competing each other based on features and quality of services. In DTH segment the operators are competing based on features and quality of service, and if CAM modules were available at much lower price, then interoperability in DTH segment would have been a reality and customers would have been able to shift from one DTH service to another without changing STB. The situation in Cable TV service is completely different as the customer does not have a choice available for shifting from another Cable TV service to another. Though some competition do exist, but still to move from a Cable TV service to DTH service (or reverse) or from one DTH operator to another DTH Operator, Subscriber has to buy another STB and any such shift today causes premature generation of e-Waste. 'Locking in' customer by seeding proprietary STB can hardly be called 'perfect competition'.

In Indian market today we only have completely proprietary STBs that are designed to work only with one operator, creating a walled garden for that operator, requiring consumers to use different boxes for different operators. This can definitely be addressed by interoperability. However we need to be clear about the specifics of interoperability. In fact, if interoperability means to have same features for all STBs and or in turn reduced feature sets, that would definitely hinder competition. Interoperability should be so defined that it fosters competition through flexibility and innovation.

TRAI Q6.

How interoperability of STBs can be implemented in Indian markets in view of the discussion in Chapter III? Are there any software based solution(s) that can enable interoperability without compromising content security? If yes, please provide details.

Individual initial comments of the Group members:

SSx: All the solutions looks interesting. However this is a time taking activity to evaluate and many PoC are required to comment. There is a deviation from the present process. Industry response and reservation will be also there initially. The solution also needs to be commercially viable , feasible and scalable. Initially, if the box cost will be high but it may be accepted as in later stage definitely it will go down once the business process is streamlined.

SIx : As there are software-based solutions, however this will require support from SOC and CAS vendors

CASx : We recommend forming an industry wide open standard with a centralized trust management authority. Adopters would be permitted to implement the standards on their own or license technology from the technology providers. We have more than years of experience in managing such a standard, which has a proven track record of large scale deployment in Europe.

SIy: All Solution Approaches are very interesting which are mentioned in the Chapter III. Operators and Broadcasters should decide which approach is better in terms of Content security and commercially viable, feasible and scalable. All most all DPO to STB content distribution in unidirectional in India, hence it is very important and enhance Content security needs to be implemented and maintained. There is software based solutions are available and all are mainly focus security, E2E Proof of concept of those solutions are validated as per Broadcaster and Operators Content security requirements.

SOC x : Currently OTT and IP based devices have DRM that allows various content on a single device through two way checks. This is the extreme case where the OTT device is truly interoperable over content. As broadcast content is transmitted to STB's uni-directionally, enhanced content security needs to be implemented and maintained. There are software based solutions, and all of them mainly target security as this is the major reason STB's are not interoperable. Major CAS vendors need to participate in software based CAS solutions that are now available.

ICx : This question is better answered by an Operator or a Content Aggregator/Rights owner. Content security is the primary concern of content owner/aggregator. It should be left to them to decide how they want to secure their content from piracy or unauthorized viewing.

SOCy : We can separate different CAS vendor by independent CI cards or independent software. This can make STBs interoperable. Unfortunately, the size of STBs with CI card is bigger than those STBs without CI cards. For much smaller size of STBs, CAS vendors expect their proprietary, such as secret keys locates inside the chipsets. This will be against the interoperability of STBs. We expect end users can easily change the hardware related to CAS vendors in STBs. The original STB still can work normally with other CAS vendors' hardware. The independent software is another way to make STBs interoperable. But we are not sure all CAS vendors will agree implementing their protection know-how in the form of software without considering intrusion. More open or well-known environment of software, higher possibility of intrusion. The key points will be how to convince all CAS vendors could be an independent part of STBs.

CASy: Nothing further to add over and above what is discussed in Chapter III

SOCz: Software based solution is good to fix the weakness via upgrading the software, but the hardware security capability is the essential factor to protect the content. CAS vendors provide the

several solutions according to the hardware capability of the operators. It seems the operators should make the final decision on how to compromise. If the operator can't reduce the anti-piracy issue or provide a better user experience, the subscribers may cord-cut.

IESA Broadcasting Core Interest Group Collective Response after group discussion:

How interoperability of STBs can be implemented has been discussed in Chapter III in detail. All solution approaches seem interesting. However PoC is required to ensure that the solution chosen is commercially viable, feasible and scalable and additionally it is to be ensured that the STB cost is able to reach below the acceptance threshold of Indian customers after the process is streamlined.

All most all DPO to STB content distribution is unidirectional in India, hence it is very important and enhanced content security needs to be implemented and maintained. There are many software-based solutions available as discussed in Chapter III and all are mainly focus security, Proof of concept of those solutions are to be validated as per Broadcaster and Operators content security requirements.

Currently OTT and IP based devices have DRM that allows various content on a single device through two-way checks. This is the extreme case where the OTT device is truly interoperable over content. As broadcast content transmitted to STBs is unidirectional, enhanced content security needs to be implemented and maintained. Today the major reason put forward for STBs not being interoperable is security concern, so the software-based solutions mainly target security aspects.

For wider acceptance of interoperability it is suggested to form an industry-wide open standard with a centralized trust management authority. Adopters should be permitted to implement the standards on their own or license technology from the technology providers. Most importantly for interoperability to be successful major CAS vendors and SOC vendors need to participate in establishing software-based standards and implement them.

TRAI Q7.

Please comment on the timelines for the development of an eco-system to deploy interoperable STBs for your recommended/ suggested solution

Individual initial comments of the Group members:

SSx: An estimated time of 1 year.

SIx : 6-9 Months, subject to availability of required support from SOC and CAS vendors

CASx : We recommend forming an Indian standard that points to existing open standards that have already been deployed and adopted globally. Again, we will be happy to assist in such effort. Using this strategy, we think the solution can be brought to the market relatively quickly

Sly: It is joint efforts of Broadcasters, Operators community, CAS/DRM companies, Headend, SoC, OEMs and System integrators. It is very important that all should agree for implementation as 1st step and start with Proof of concept.

SOC x : As operators, CAS companies, middleware developers and SoC vendors working with OEM's are necessary to meet, discuss and deploy an interoperable system, the timelines would be 2.5 years at least in case of a completely new SOC design.

ICx : This has to be answered by the operator led value chain of system integrator, equipment suppliers, manufacturer and soc vendors.

SOCz: ETSI GS ECI 001 (01-06) standards is not a pure software based solution. It requires a new kinds of HW key ladders and SoC may spend 1~2 years or more time to support it. However, we should check industry led body in content protection comment on this standard, and wait they apply it in their solutions.

IESA Broadcasting Core Interest Group Collective Response after group discussion:

The timeline would depend on the forming an Indian standard that points to existing open standards that have already been accepted globally. It has to be a joint efforts of Broadcasters, Operators community, CAS/DRM companies, Headend, SoC, OEMs and System integrators. It is very important that all should be agree for implementation of the standard starting with Proof of concept as the first step. If the presently available Semiconductor design can be used the SOC availability timeline would be six months, however if completely new semiconductor is to be designed for the interoperability standard it would take one to two and half year considering all activities design are done in parallel.

TRAI Q8.

Do you agree that software-based solutions to provide interoperability of STBs would be more efficient, reduce cost of STB, adaptable and easy to implement than the hardware-based solutions?

If so, do you agree ETSI GS ECI 001 (01-06) standards can be adopted as an option for STB interoperability? Give your comments with reasons and justifications.

Individual initial comments of the Group members:

SSx: Yes it seems to be economical. It will take some time to give comment on ETSI GS ECI (01 – 06) standards.

Slx : Not sure

CASx : We agree that software-based solutions (such as those based on the ETSI ECI standards) can be brought to the market much faster and can provide much better interoperability. Software-based solution can be combined with hardware-based Trusted Execution Environment (TEE)-based secure content governance to create so-called hybrid software/hardware-based solutions that can provide the same level of security as many hardware only solutions. The requirement of such a TEE-based approach for all content protection logic has been adopted by Hollywood studios for clients devices (TVs and STBs) participating in ecosystems involved in distribution of premium content such as 4K movies and early release window content.

Sly: We believe software-based solutions can be brought to the market much faster and can provide much better interoperability. Not Sure ETSI GS ECI 001 (01-06) standards can be adopted as an option for STB interoperability.

SOc x : From an SoC perspective there is no reason that ETSI GS ECI 001 (01-06) standards will not work. It is up to CAS companies to ratify this and provide a working solution.

ICx : Be it Software or Hardware based solution, both adds BOM cost to the box. It is not going to be a cost neutral solution. Following globally accepted standards is a better way to leverage economies of scale.

CASy: Due to lack of market drive, we have not fully evaluated efficiency, cost or ease of implementation of such solutions based on ETSI GS ECI(01-06) standard or otherwise and therefore cannot provide an opinion on this.

SOcy : Independent software is a way to make STBs interoperable. But we are not sure all CAS vendors will agree implementing their protection know-how in the form of software without considering intrusion. More open or well-known environment of software, higher possibility of intrusion. The key points will be how to convince all CAS vendors could be an independent part of STBs.

SOc z: Software-based solution is not an efficient way to reduce cost of STB. Usually, it is more efficient to implement counter measures and resistance to attack by using hardware than using software. A software based resistant of attack requires more computing power, which means increase of SoC cost. And ETSI GS ECI 001 (01-06) is not a pure software based standard. The SoC HW has to integrate a new kind of key ladder, which I don't think any STB SoC has it before. Therefore, it increase STB cost

IESA Broadcasting Core Interest Group Collective Response after group discussion:

ETSI GS ECI 001 (01-06) is not a pure software based standard. The SoC Hardware has to integrate a new kind of key ladder functionality defined by the standard. It is efficient to implement counter measures and resistance to attack by using functionality of multi-level hardware key ladder. From SoC perspective there is no reason that ETSI GS ECI 001 (01-06) standards will not work. Some SOC vendors have presently available semiconductor designs which would be able to be deployed for these standards,. Other SOC vendors would have to implement the standard.

The solution appears economical. Software-based solutions (such as those based on the ETSI ECI standards) can be brought to the market much faster and can provide much better interoperability. However as the STBs would be new, the initial cost might be higher, but with the advantage of economy of scale it should reduce overall cost level once implementation stabilises.

Additionally, Software-based solution can be combined with hardware-based Trusted Execution Environment (TEE)-based secure content governance to create so-called hybrid software/hardware-based solutions that can provide the same level of security as many hardware only solutions. The requirement of such a TEE-based approach for all content protection logic has been adopted by Hollywood studios for clients devices (TVs and STBs) participating in ecosystems involved in distribution of premium content such as 4K movies and early release window content.

It would need participation of CAS providers to ratify the standard and provide necessary working solutions for each individual CAS which are to be deployed in India.

TRAI Q9.

Given that most of the STB interoperability solutions become feasible through a common agency defined as Trusted Authority, please suggest the structure of the Trusted Authority. Should the trusted authority be an Industry led body or a statutory agency to carry out the mandate? Provide detailed comments/ suggestion on the certification procedure?

Individual initial comments of the Group members:

SSx: It will take some time to comment on the proposed structure.

CASx : A standards organization should include a specification creation body that creates the technical specifications that define the specific interoperability framework agreed by the members. In addition to this body, there should be a Trust Authority. The Trust Authority should include the following components:

1. A Policy body, which should include industry representatives and possibly government representation if the founding group deems it necessary, and which defines the compliance, certification and licensing policies associated with the standard.
2. A Licensing Authority that is responsible for licensing the technical specifications created by the group.
3. Trust Anchor and TSP (Trust Service Provider) that is responsible for certifying compliance with group-defined compliance and robustness (C&R) criteria and for making required credentials available (e.g., public key pairs and associated certificates) to compliant implementations.

A perfect example would be the open standard Marlin DRM root of trust, called the Marlin Trust Management Organization (MTMO) - see <https://www.marlin-trust.com>. Marlin supports all the above functions. Certification under Marlin is done via a self-certification process by which device manufacturers measure their compliance with Marlin C&R rules via technical questionnaires and affidavits attesting to the accuracy of the responses to the questionnaires. This procedure has proven to be far less costly to the manufacturers than third-party certification, and to date, has always been found acceptable to content owners, including major Hollywood studios.

Sly: Trusted Authority must be an independent 3rd party and ensure that any security sensitive information should be maintained in a secure manner. We are very initial stage to comment on the proposed structure. It will evolve once we cross POC stage and bring all of them on same page.

SOC x : Again from an SoC perspective this structure is agnostic. CAS companies need to give the basic structure.

ICx : It should be similar to Mobile Number portability (MNP) regulation and authority. If it works for 1B subscriber base, it should work for 160-180M subscriber base in broadcast sector also

CASy: Our primary concern is that the Trusted Authority must be an independent authority and ensure that any sensitive information should be maintained in a secure manner and only disclosed to those parties with the right of access to it and the implementation of any process is as agreed. At this time we do not have as opinion of the structure of the trusted authority.

SOCz: In our understanding, the Trusted Authority is the one who is willing to take the responsibility to resolve every piracy issue and willing to compensate the content provider lost because of the piracy. In this case, it may not be the statutory agency.

IESA Broadcasting Core Interest Group Collective Response after group discussion:

The primary concern of the stakeholders are that the Trusted Authority must be an independent authority and ensure that any sensitive information should be maintained in a secure manner and only disclosed to those parties with the right of access to it and the implementation of any process is as agreed.

It is suggested that the Trust Authority should include the following components:

- 1. A Policy body, which should include industry representatives and government representation which would define the compliance, certification and licensing policies associated with the standard.*
- 2. A Licensing Authority that is responsible for licensing the technical specifications created by the group.*
- 3. Trust Anchor and TSP (Trust Service Provider) that is responsible for certifying compliance with group-defined compliance and robustness (C&R) criteria and for making required credentials available (e.g., public key pairs and associated certificates) to compliant implementations.*

There are not enough information with the stakeholders to suggest specific structure for the Trusted Authority or whether the Trusted authority should be an Industry led body or a statutory agency to carry out a mandate. However it is suggested to examine the example of the open standard Marlin DRM root of trust, called the Marlin Trust Management Organization (MTMO) { <https://www.marlin-trust.com> }

TRAI Q10.

What precaution should be taken at planning stage to smoothly adopt solution for interoperability of STBs in Indian market? Do you envisage a need for trial run/pilot deployment? If so, kindly provide detailed comments.

Individual initial comments of the Group members:

SIX : Yes

SSx: Without trial or PoC it is not possible and there are many stake holders.

CASx : We recommend forming a small group to define the policy and strategy first with one or two key technology providers and a few top device makers. This group would flesh out a strategy for defining key interoperability points, determining the ideal partners in such an undertaking, and a process for bringing the strategy to fruition.

Sly: We believe, bringing all the stakeholders on same page and their commitment to implement the agreed way of interoperability plan itself is a big challenge. It is very important to do required E2E POC's to incorporate required precautions need to take at planning stage. This will help anticipating

need of integration efforts, Lab testing, Field testing and new service enablement starting from Business planning stage to end Customer acceptance.

SOC x : The main issue is the planning stage itself. Operators and CAS vendors should align first with the agreement on the exact standard being proposed. Once this agreement is in place the SoC vendors need to be pulled in to participate along with middleware developers. If the encryption standard being proposed is with a Trusted Authority, then a pilot deployment may be necessary.

ICx : Onboarding all stakeholders and getting their commitment to implement the agreed way forward plan is critical. Ensuring that industry is not getting burdened to implement the regulation is a win-win approach.

SOCz: It would be better to make a trial before massive deployment. During this trial, it's better to emulate piracy event, see how the system can deal with it. Check user's wiliness to bear the cost for boxes. Check operator and device maker's wiliness to invest in any innovation during this trial.

IESA Broadcasting Core Interest Group Collective Response after group discussion:

Getting all stakeholders on board and getting their commitment to implement the agreed way forward plan is critical. Bringing all the stakeholders on same page and their commitment to implement the agreed way of interoperability plan itself is the first challenge. The main issue is the planning stage itself. To begin with it is required that the Operators and CAS vendors align with the agreement on the exact standard being proposed. Once this alignment with the agreement is in place the SoC vendors will have to participate along with middleware developers and system Integrators. It is very important at planning stage to incorporate required functionality for interoperability, required precautions and necessary security testing, which will further need to be demonstrated during POC itself along with the Trusted Authority. This will help all stakeholders to anticipate need of actual integration efforts, Lab testing and Field testing, all of which are essential from their perspective of business planning to end Customer acceptance. It has to be a team effort of Operators, CAS/DRM companies, Headend, SoC, OEMs and System integrators to define and agree key aspects of interoperability, and security and accept those during the course of POC.

TRAI Q11.

Interoperability is expected to commoditize STBs. Do you agree that introducing white label STB will create more competitions and enhance service offerings from operator? As such, in your opinion what cost reductions do you foresee by implementation of interoperability of STBs?

Individual initial comments of the Group members:

SIX : Yes, not sure on the costing

SSx: Competition is always better than monopoly. Can't comment on the other part.

ICy: Operators have been subsidizing the STBs to subscribers to seed or penetrate market. This reduces the upfront cost to the customer. Though it had worked well for initial deployment, the subsidy cost is sitting in books of account of the operators limiting their ability to deploy newer functionality of service requiring upgrading of STBs. An "open market" STB will allow the customers

to select STBs of their choice and relieve the operators of their financial burden of seeding. Economy of scale will reduce the cost of the STB. The commoditisation of STB will bring in larger Consumer Electronics brands into STB market. However at the time of implementation of interoperability reduction of STB price is not expected.

CASx : We recommend a standards based approach that can ensure interoperability across STBs and that can also be implemented by TVs, thereby reducing and eventually eliminating the e-waste problem. This simplifies everything from the consumer's perspective. It is critical to define the specific crucial points of interoperability and that attention be paid to ensuring that the standard solution promotes innovation and the other goals that have been determined as critical to the success of the endeavour. This includes environmental concerns

Sly: We do not see any cost reduction of STBs that are interoperable. In fact, this will increase STB cost. Interoperability will save STB cost in case Subscriber switching from one operator to another operator.

SOC x : We do not see any cost reductions of STB's that are interoperable. Interoperable STB's save cost only if users switch operators without buying new STB's. We need to know the rotation rate.

ICx : Competition should be left to the market forces. Electronics Industry has thrived on competition led cost reductions, it will continue to happen.

SOCz: White label STB will create more cost competitions, but the impact is in device makers and there should be have the standard first. Check the cost reduction with the device makers or the operators should get the related information. The operators have continued to enhance their services, especially the rapid launch of OTT services. This part may not be related with interoperability.

IESA Broadcasting Core Interest Group Collective Response after group discussion:

Operators have been subsidizing the STBs to subscribers to seed or penetrate market. This reduced the upfront cost to the customer .Though it had worked well for initial deployment, the subsidy cost is sitting in books of account of the operators limiting their ability to deploy newer functionality of service requiring upgrading of STBs. Commoditisation of STB through an market STB will allow the customers to select STBs of their choice and relieve the operators of their financial burden of seeding. Economy of scale will reduce the cost of the STB. The commoditisation of STB will bring in larger Consumer Electronics brands into STB segment and distribution through established consumer electronics channel will develop STB market. However at the time of implementation of interoperability reduction of upfront STB price is not expected due to lack of subsidy. Interoperable STB's will save actual cost only when users switch operators without buying new STB's.

TRAI Q.12

Is there any way by which interoperability of set-top box can be implemented for existing set top boxes also? Give your suggestions with justification including technical and commercial methodology?

Individual initial comments of the Group members:

SIx : This is difficult

SSx: Needs to be talk with OEMS and the CAS vendors. Presently doesn't seems it is possible.

CASx : Retrofitting existing STBs to work with services different from the ones for which they were designed, although in theory possible, would require a substantial effort and the cooperation of many parties. The effort may be too expensive and not 100% reliable from a technical point of view. The reason for this is that today STBs are made in silos without a standardized approach that would allow adding new features, e.g., security modules, UI, operator configurations etc. In other words a STB has traditionally been, by definition, a closed system.

Sly: We don't think it is possible for existing STBs'. There are few STB's having DVB-CI+ 2.0 as an option, we can use those boxes interoperable using CI modules. However CI modules are expensive than STB cost today for Indian Market.

SOC x : Interoperability of current set-top can be extended to also include DVB-CI+ 2.0 as an option, till the new standard comes in. This way the SoC cost and the solution cost can be reduced from DVB-CI+ 1.4 standard that uses a PCMCIA card to a ultra low cost USB solution. This will provide an interim optional solution to those OEM's and SoC vendors that want to reduce current interoperability cost of the STB.

IC x: this has to be answered by group of Operator CTOs

CASy: We have not fully evaluated methods for implementing STB interoperability for existing STBs. The challenges foreseen are well documented in the consultation

SOCz: This is a big challenge. If we want the existing STB supports interoperability, we should check these STB hardware and software capability first. It will be the big effort.

IESA Broadcasting Core Interest Group Collective Response after group discussion:

Retrofitting existing STBs to work with services different from the ones for which they were designed, although in theory possible, would require a substantial effort and the cooperation of many parties. The effort may be too expensive and not 100% reliable from a technical point of view. The reason for this is that today STBs are made in silos without a standardized approach that would allow changing features, e.g., security modules, UI, operator configurations etc. In other words STB traditionally was, by definition, been designed to work for a closed system. It is not possible for existing STBs to be interoperable. In case any existing STB is already having DVB-CI+ 2.0 interface option, that STB may be made interoperable using DVB CI-2.0 module, if CAS company provide it, However such CI modules are expensive than STB cost today for Indian Market, hence such limited solutions also would not be workable.

TRAI Q13.

Any other issues which you may like to raise related to interoperability of STBs

Individual comments of the Group members:

CASy: The challenges foreseen are well documented in the consultation

SOC x : Middleware & CAS are essential components of all STB's. Making STB's interoperable will need middleware and CAS companies to work on a solution that can be common across a hardware architecture. This is the crux of an interoperable STB.

- Standardized Hardware Platform
- CAS solution
- Middleware compatibility to CAS and Hardware

SSx: The R&D and business does not go hand by hand. So commercial viability issues may come like the CI slot for which the CAM cost was equal to the STB cost which never took well. Three aspects are always needed to taken care e.g. commercial viability, scalability and feasibility. These issues will slowly settle down & TRAI /MIB should take care of the same.

SOCz: Content protection is the key to make Pay-tv industry grow and develop healthy. Once the security functions could be in the standard or framework architecture, we could move forward to interoperability. If we focus on the common and basic market like as zapper, it may be easy to come out the standard that agreed by CAS vendors and operators because this segment has low security level requirement. Interoperability of STB should bring the cost competitions among the device makers. It should bring the opportunity for the small local device makers.

In PayTV industry, the content protection is the key to make sure the PayTV industry could continue to grow and development. That is why all of interoperability approaches are related with security module design. "Service provider" and "CAS vendor" are the decision makers on the security solutions for content protection. Our SoC had the fundamental capabilities for "Separation of CAS from STB (Card based approach)", "DVB CI & CI+" and "Downloadable CAS" approaches. System integration companies and CAS vendors could follow TRAI these approaches now. Interoperability of STB should bring the cost competitions among the device makers. It should bring the opportunity in common and basic market(like as zapper) for the small local device makers .

CAS x: In order to have a successful open standard, a sound IP licensing strategy should also be developed carefully

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