



**Comments of Indian Broadcasting Foundation on the TRAI's Consultation Paper dated November 11, 2019 on Interoperability of Set Top Box ("Consultation Paper")**

**Introduction:**

At the outset, we would like to applaud the Authority's efforts for exploring various available solutions for achieving interoperability in unidirectional broadcast network and providing opportunity to the stakeholders for providing their views on technical interoperability of set top boxes ("STB") by way of the Consultation Paper under response.

The Authority, in the present Consultation Paper has stated that though there is a de-jure technical interoperability but there is de-facto technical non-interoperability. Despite presence of provisions relating to interoperability in the existing DTH Guidelines, the concept has not yet been implemented owing primarily to the inability to provide secure solutions. There may be various reasons for the same. The encryption of the TV signals which is done by the broadcasters are unencrypted by the distribution platform operators ("DPOs") and then they are re-encrypted before being retransmitted to STBs installed at subscriber premises. These signals are thereafter, decoded by the STBs. The STBs are paired with conditional access system / subscriber management system of relevant DPO so that there are minimum chances of unauthorized access or piracy of the content.

At the outset, we request the authority to consider the following, preliminary submissions while contemplating any options for the implementation of STB interoperability –

- a) Viability of implementation of STBs – at present there is no technology by which existing STBs can be made interoperable. In case technical interoperability is to be achieved then the existing STBs have to be replaced by new, upgraded and costlier STBs which if replaced will also result into huge e-waste.
- b) Cost – Any addition of technology to the STBs will make STBs costlier.
- c) Safeguarding content – Content is the asset and the copyright on content is a protected right therefore security of content is extremely critical to the broadcaster, and to the revenue ecosystem.
- d) No compromise on security – Any additional technology/changes/upgradation of the STBs should ensure that there is no compromise on the security of content and should not allow piracy/unauthorized access to signals. Technology currently does not provide any safeguards to restrict hacking which in turn will enable piracy of signals.
- e) To proceed any further with the consultation, it would be most useful and relevant to conduct a technical and operational session to get a better understanding of the technology and possibly emerge with a proof of concept, prior to commenting on the technology and viability. It would be important to understand and analyse how



the broadcasting eco system would transition to interoperable STBs with no disruption of the Pay TV system.

With the new regulatory framework in place, the cost of TV services is platform agnostic and the consumers are generally offered the TV services at almost comparable costs by DPOs. Hence, the migration by the consumer from one DPO to another on the basis of expense would be limited. There may be other factors like higher channel carrying capacity, advanced technology, good service support, which may be the factors because of which the consumers may still consider changing their service provider/DPO.

The introduction of STB interoperability would require a number of technological as well as operational capabilities and change thereby fostering the necessity to introduce content security provisions and anti-piracy mechanisms. At the same time, it would be needed to be ensured that the expenditure incurred in acquainting the STBs with interoperability features, does not get irrationally passed on to the consumers and that they are not burdened with the increased costs incurred. Interoperability amongst MSOs may not be as successful as the usual practice in the cable industry in India is that in most areas only one cable operator is active in a particular area. In India, cables carrying signals of television channels that reach consumer premises are not structured to carry signals of various multi system operators (“MSOs”). Further, there are also instances of monopoly in the last mile. Considering that majority of local cable operators (“LCOs”) / MSOs do not operate in all areas within their authorized areas of operation therefore, interoperability of STBs may be of limited consequence since, it will first require laying of fresh cabling by MSOs up to the subscriber’s premises, which may itself not be feasible *inter-alia* due to costs involved. There may also be integration related issues since, DPOs have proprietary middleware licensed from different vendors. The middleware is responsible for navigation experience, visual, graphics, electronic programming guide details, logical channel number, platform services, etc. and the middleware of one DPO may not work with STBs of another DPO.

Most importantly, any regulatory provisions should be mandated after confirming viability, quality and standards of the emerging technology and should ensure that the security of the CAS, SMS and other related addressable systems of the DPOs is not compromised and is not susceptible to piracy. The security of the Broadcaster’s content also needs to be ensured thoroughly in the entire distribution chain. At the outset, the Schedule III requirements need to be met and enhanced to address increased possibility of unauthorised signal transmission.

The security specifications, standards, technical specifications and the content protection mechanism of the STBs must be thoroughly checked over a period of time and assessed by independent companies and vendors having expertise *inter-alia* in scrutiny of technical standard and security assessment before any recommendations are made by the Authority. It is submitted that in case of STBs that use smart cards, the protocol between smartcards and the compatible STBs must be reviewed by experts to ensure the robustness in case interoperability is proposed to be implemented. Similarly, in case of



downloadable systems the security of the download system and the API interfaces between the downloaded client and the host must be thoroughly reviewed by experts.

On the basis of these principles, we would like to comment in particular on Embedded Common Interface (“ECI”), a solution considered by TRAI to achieve interoperability. IBF is concerned that ECI does not meet the content security and technology needs of major content providers. TRAI stated in its consultation paper, *“the ECP specification describes best practice for all premium content services, including Pay TV and live sports.”* ECP includes strong content security features and the ability to forensically watermark content distributed on home devices, set top boxes, etc.

ECI falls short of the ECP requirements. In particular, ECI does not require watermarking and does not create a secure location for a watermark.

The European Telecommunications Standards Institute (“ETSI”) issued ECI under a closed, industry group process, which was not subject to an open standards participation and review by all stakeholders. The specifications are currently under wider review at the ITU-T in Study Group 9. It would be premature to consider ECI until it has passed wider review and international approval and until, as we noted above, it satisfies TRAI’s requirement that *“any solution for interoperability of STB must pass the scrutiny on account of content security.”*

In order to protect from unauthorised access to content, broadcasters must be aware about the type of encryption and the protection methodology. In case of any known and/or contemplated threat to content protection, broadcasters must be able to initiate enquiry / investigations by subject matter experts to check and diagnose the encryption system and wherever possible suggest required changes in such encryption systems of DPOs for content protection. The suggestion by such experts in such encryption/protection methodology must be implemented by DPOs. The DPOs should also be required to ensure that the encryption system of DPOs are up to date with the evolving technology and the STBs shall be capable of installing over the air any technical upgrade to such systems. The broadcaster should also be provided with additional rights to test in advance such interoperable STBs before they are deployed in the market.

It is submitted that the various approaches adopted to achieve interoperability of STBs should not compromise the content protection or restrict the innovations or deployment in new content protection technologies. In so far as the suggestion regarding creation of centralized trust authority is concerned, it is submitted that such authority should not be vulnerable to hacking attempts for theft of data and should not be soft targets to disrupt operations by malware attacks. It is submitted that serious threat to robustness of content protection mechanisms would be posed if the system is vulnerable risking the entire distribution value-chain. Having a diversified content protection mechanism and different security approach shall be preferred over one centralized system since, it tends to limit exposure.

It is submitted that software based interoperable solutions may reduce the cost of the STBs however, there are many indirect costs involved in their management like the



additional human resources required to follow the procedures, etc. The software-based solution such as, ECI may also prone to hacking and piracy. Further, shifting of compliance responsibilities (which are normally collaboratively administered by stakeholders and Digital Rights Management ("DRM") providers) to a "trust authority" may making it difficult to test DRM compliance, or to quickly access needed information, and/or to fix issues involving data breaches. Further, if ECI standards as proposed in the Consultation Paper are implemented then there may be risk of major CAS and STB providers exiting Indian market in case, they are unwilling to share their proprietary information/keys either with STB manufacturers or the trust authority. It is submitted that the industry is already plagued with DPOs deploying faulty / compromised CAS and SMS, and any such exodus will have an adverse impact on revenues of broadcasters.

As regards to the availability of interoperable STBs through the open market, it may not provide the benefits of commoditization as the manufacturing plants of STBs set up in China, Vietnam, Thailand over the last decade have amortised the cost of the plant and due to intense competition, the STBs are being sold at quite competitive prices. Even otherwise, the DTH operators/large MSOs are the bulk purchasers hence enjoy high bargaining power and are able to purchase the quantity in bulk at highly competitive rate. For example – the present price import price of HD STB is USD 15 which may not provide much room for further reduction.

With the above premise, we hereby submit our question wise response to the CP as below:

**Q1. In view of the implications of non-interoperability, is it desirable to have interoperability of STBs? Please provide reasoning for your comment.**

**Comments:**

At IBF we believe that all apprehensions of ECI standards should be first dispelled and a well thought out policy finalized post adherence to time tested international standards. Though the intent behind interoperability cannot be doubted, such a move would be a welcome change for the subscribers. With no dilution of anti-piracy features, which will enable broadcaster's content security, interoperability of STB's should be implemented. Interoperability will enable consumers to choose the service provider of their choice however the Authority must ensure that they must not be charged additionally for making the switch. It is suggested that the Authority may adopt a planned phased approach with the exclusion of extant STB's which are not fit enough to be interoperable. Such an approach will not only make the migration process continuous, effortless and seamless without rushing the stakeholders into scheme of things but will also ensure that there is no compromise as regards protection of content and security features of the STBs.

It has already been established that the ECI standard does not meet the requirements of a secure interoperable system and hence the Authority should not be in a hurry to finalise the same as technology to be adopted for interoperability of STBs. Adequate tests and



safeguards should be taken before finalizing any standard. Some consortiums are also talking of a much advanced Enhanced Content Protection (“ECP”) standards. Also, our members have apprehension about the broadcaster Fingerprinting (“FP”) in an interoperable environment - whether the same would pass through. It is imperative that the issues raised herein are addressed before implementation of interoperability of STBs. Interoperability should not dilute anti-piracy features of the STBs, should not happen at the cost of content security, and adequate safeguard measures need to be taken in case interoperability. Only on the condition that interest of the broadcaster in relation to its content is being taken care of and no compromise is made in that regard under any circumstances whatsoever, our members believe that it would be desirable to have interoperability of STBs since it would benefit the consumers at large.

The consumer should be free to choose his service provider without any barriers. However, it should also be ensured that when the consumers are opting for shifting to other DPOs, they should not be charged any additional activation fee. A detailed roadmap should be prepared with clear cut timelines so that all the manufacturing and procurements aspects by different players are taken into account and no unnecessary hiccups are caused in the system. The present STBs which are already seeded into the market should not be considered for making them compatible for interoperability due to various practical issues. Only the future STBs which will be manufactured and procured after a clear cut implementation schedule shall be considered for making them interoperable.

**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.**

**Comments:**

When the alternative technologies are being thought of and considered, such technology should be future ready and should not be restrictive.

Universal inter-operability of STBs in Cable and DTH is not viable in the given conditions. There are different methods of encryptions, modulations, compressions and the operating systems involved in the current lot of installed STBs and CAS. Algorithms differ from one manufacturer (STB & CAS) to another and it is proprietary in nature. Also, safeguarding the security concerns with respect to content of broadcasters/content owners is an issue. Even today with proprietary algorithms, piracy is all prevalent and there are very few systems which are not capable of being hacked. Having said that, if there is STB interoperability only within a particular platform, then the same may not meet the desired objectives. The Authority needs to address the issue holistically and at once, even though the same may seem unviable in the present scenario. In case



interoperability of STBs is implemented then it should be across platforms enabling the viewers to be able to switch from one platform to another.

As a pilot project, the Authority may introduce interoperability within platforms only i.e. Cable or DTH and later can look into transition of the same and make it universal interoperability if found feasible.

**Q3. Should interoperable STBs be made available through open market only to exploit benefits of commoditization of the device? Please elaborate.**

**Comments:**

As regards the availability of interoperable STBs through the open market, it may not provide the benefits of commoditization as the manufacturing plants of STBs set up in China, Vietnam, Thailand over the last decade have amortised the cost of the plant and due to intense competition, the STBs are being sold at quite competitive prices. Even otherwise, the DTH operators/large MSOs are the bulk purchasers and enjoys high bargaining power and are able to purchase the quantity in bulk at highly competitive rate. Hence there cannot be any additional gains foreseen arising out of commoditization.

It is of utmost importance that any policy decision should clearly lay down that no compromises are made in the security features of the STBs and that there is a comprehensive system of checks and balances in place. We recommend that KYC could be an additional feature during purchase of such STBs as it is the norm for everything else.

In case a policy decision is taken to make the STBs available through open market, it should be ensured that all the security features are fool-proof and governed by Regulations to ensure checks and balances. Additionally, purchase of STBs should mandate KYC registration.

**Q4. Do you think that introducing STB interoperability is necessary with a view to reduce environmental impact caused by e-waste generated by non-interoperability of STBs?**

**Comments:**

The argument that e-waste is generated because of non-interoperability of the STBs may not be fully true.

Any advancement in technology makes a particularly widespread used earlier system redundant. Technology upgrade will tend to leave e-waste which seems to be a natural corollary. There must be a different government organ to deal with the e-waste policy.

DPOs are reusing the STBs by connecting new consumers with the same STBs. Hence, it cannot be said that non-interoperability of the STBs is generating e-waste. On the contrary, in order to implement interoperability of STBs by replacing new, upgraded





STBs with the existing STBs will result in huge e-waste. The e-waste is the outcome of primarily the technological advancements and the consumer aspirations to align himself with latest technology. This is a natural phenomenon with the all the electronics and there should be an e-waste policy to deal with this.

**Q5. Is non-interoperability of STBs proving to be a hindrance in perfect competition in distribution of broadcasting services? Give your comments with justification.**

**Comments:**

In our view, this assumption is not correct. With the new regulatory framework in place, the cost of TV services is platform agnostic and the consumer is generally offered the similar kind of costs for TV services. There is competition in the market and there should be emphasis on implementation of quality of Service and standards for the competition to enable the DPO to provide best possible services at competitive rates in order to ensure that the consumer takes that particular DPOs signals. Hence the migration from one service provider to another by a consumer merely for cost considerations may be limited. So for a consumer to switch platforms would be dependent on other factors such as, higher channel carrying capacity, advanced technology, good service support etc. which may be the factors which the consumer may consider for changing his service provider. The interoperability of STBs will have a very limited role in deciding the migration of consumer from one service provider to another. One more point to be noted is that the DPOs are generally subsidizing the cost of STB and other consumer point equipment for consumer acquisition. Hence the entire cost of STB is not recovered from the consumer at the time of installation and it is recovered over a period of time from the service cost. Hence there is no significant cost for switching and sometimes it is absorbed by the DPOs fully if a subscriber chooses a long term plan for example period of over one year. Another option that may be considered is a compulsory buy-back option for up to a certain period of time by DPOs in case of discontinuation of the service by the consumer. This will ensure that the consumer interest is protected.

**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.**

**Comments:**

The experience of STB interoperability in overseas markets has been not very great. The same should be endeavoured to be done in the Indian market with caution. The security of the broadcaster's content should be given paramount importance. The broadcasting industry is plagued by the incessant piracy issue and any attempt to make the STB interoperable at present may result in increased piracy. Hence the security standards to be implemented for interoperable STBs should confirm to time tested international standards.



**Q7. Please comment on the timelines for the development of eco-system to deploy interoperable STBs for your recommended/ suggested solution.**

**Comments:**

IBF recommends a pilot project to begin with. Successful results in the ground testing will not only ensure efficacy of the project on a greater scale but will also test the intent and effort of the stakeholders involved. Phased implementation will lead to a situation wherein DPOs can make long term orders based on financially sustainable model without putting them under too much of economic duress.

We suggest that the deployment of interoperable STBs should be made on pilot basis. After successful ground testing during the pilot phase, the same should be considered for implementation in future STBs. Further sufficient time for implementation in a phased manner should be given so that all the players are aligned to the same. Since the entire STB manufacturing depends on long term orders by DPOs, the same needs to be taken care while implementing the same.

**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.**

**Comments:**

We are of the opinion that though the software-based solutions to provide interoperability of STBs may prove to be more effective, cost efficient, adaptable and easy to implement than the hardware-based solutions but we re-iterate the importance of the uncompromised security of the CAS, SMS and the entire related addressable system and its insusceptibility to piracy.

However, w.r.t ECI, we feel that there are apprehensions amongst the stakeholders on the ECI standards as they are of the view that ECI does not meet the content security and technology needs of major content providers. The proposed ECI standards do not meet ECP standards which describe high-level security requirements for the distribution of content. Also, ECI does not require watermarking and does not create a secure location for a watermark. Watermarked content is crucial as it helps in identifying data breaches and protects content stored on computer servers. Detailed analysis and evaluation would be required in respect of software based solutions and hardware based solutions in order to arrive at a conclusion as to which solution would more effective. Security of the content should be sacrosanct. There is an increased possibility of hacking/manipulations/manoeuvring in case of a software based solution. Therefore,





any such software based solution should be fool-proof and thoroughly tested prior to implementation.

**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?**

**Comments:**

Without prejudice to the foregoing, IBF believes that an independent, technically proficient authority should be created which can vouch for the security of the systems. At any given point in time when one stakeholder shifts the compliance burden on the other stakeholder, it will create a problem of compliance.

*IBF believes that Trusted Authority (TA) should be an independent, technically proficient Industry Licensing Authority which can vouch for the security of the Systems through the process of fabrication of key ladders which are fused into the Soc (System on a Chip). However, by shifting compliance responsibility on the TA, it may be difficult to test compliance checks.*

**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.**

**Comments:**

The following precautions are suggested:

- There should be no compromise of the CAS, SMS and other related security system in the entire chain of delivery of signal from broadcaster to the end consumer.
- The software based system if envisaged should be fool-proof and should not be subject to manipulation or manoeuvring.
- Only the future STBs should be considered for interoperability.
- The detailed cost benefit analysis may be undertaken.

Further a trial run/ pilot project is suggested before actual roll-out. Tests should be run in networks having multiple types of STBs and CAS. Also, the issue pertaining to STBs for DD Direct needs to be resolved.



**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?**

**Comments:**

Interoperability would be game-changer as it will strengthen the service offering of any operator. Mistakes or faults which have been neglected so far will not be ignored or condoned if the services are deficient and found wanting. Retention of existing subscribers will be a challenge and the best and fittest would survive. There is another fallacy to this line of thinking as well as if the distributors are found failing in their services then the consumer may move on to a different platform altogether.

We feel that interoperability of STBs would enhance service offering from the operator. The operator will also be in the fear of losing its subscribers in case of deficiency in services and hence would ensure enhanced service offering to its existing subscribers for retaining them. This will also be beneficial to the consumers and will help retain consumers in the same distribution ecosystem. Otherwise if frustrated by one distributor, the consumer may not like to again spend money to procure other STB for moving to another distributor and may decide to go to other modes of delivery.

**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?**

**Comments:**

The existing CAS/STBs and their algorithms/control words are proprietary in nature and vary with each vendor. For e.g. vendors like NOS, Conex, Irdeto etc will have their own algorithms which would be inbuilt in the STBs for a particular CAS. Hence it will not be possible to integrate the existing STBs with other CAS unless there are some modules to integrate the same. Even if the same is possible technically, we do not foresee any gains arising from such move to any stakeholder rather it will bring in chaos and mismanagement and additional costs without any resultant benefit as due to technological advancement, the rationale and technology for making them interoperable does not exist. Hence the interoperability for existing STBs (and even those STBs which are available as stock/in manufacturing line on orders of the DPOs) should not be considered. However, going forward, after a suitably agreed cut-off date, all STBs can have interoperability (subject to proper security environment). Only the Smart Card or the software based authorization should come from the DPO and the STBs may be freely available in the market which are compatible for both DTH/Cable modes.



**Q13. Any other issues which you may like to raise related to interoperability of STBs.**

**Comments:**

The Authority should take a practical view on the subject and should not compare the interoperability of the STBs with the MNP or portability in the telecom sector as the two scenarios are not comparable. Interoperability may be considered for future STBs only if it makes economic sense for all the stakeholders and consumers.

Interoperability system should ensure that where multiple feeds are taken by the operator, subscriber switch is made. We must also point out that the industry is having to deal with many regulatory changes almost simultaneously. The migration to the NTO has taken time and also resulted in a drop in the overall subscriber base. Upgrading of infrastructure requires capital funding which is scarce. Hence, any attempt at a systemic change that requires capital investment and consumer education needs to be thoroughly debated, discussed and tested before a final decision is taken. It is also equally important that the regulatory provisions for including interoperability of STBs should ensure safeguards with respect to content and security concerns pertaining to piracy of signals.