

COMMENTS ON TRAI CONSULTATION PAPER No 5/2020
ON FRAMEWORK FOR TECHNICAL COMPLIANCE OF
CONDITIONAL ACCESS SYSTEM(CAS) and SUBSCRIBER MANAGEMENT
SYSTEM (SMS) for BROADCASTING AND CABLE SERVICES

Lt Col VC Khare (Retd), Cable TV Industry Observer

Introduction

1. Conditional Access System(CAS) involves encryption of video content and is responsible for enabling viewing of content on condition of compliance of conditions; payment for PAY content principally, and access by authorization of viewing device, the Set Top Box (STB). CAS , on encryption, makes video content un-intelligible to watch and simultaneously sends instructions to the viewing device on how to restore intelligibility, if the subscriber using the STB has elected to watch such content. This protection of enabling watching by choice, protects content, while in transit from Headend to Subscriber device. Once decrypted, there is no assurance on protection of content beyond the STB, if any.

2. Subscribers have to be authorized to watch encrypted content through their devices. SAS(Subscriber Authorization System) is the concept, which in sync with CAS, enables subscriber device, i.e. addressable STB, to access viewing selectively and remotely. This authorization subset at the Headend is called the SMS (Subscriber Management System), which encompasses subscriber details, choices, customer care, billing and MIS generation. In a way, SMS works as front end while CAS works as backend in the computerized video delivery service management at the Headend.

3. While government utterances attribute DAS as assurance for Subscriber empowerment, on being enabled to select what to watch, and pay only for such selection when billed, the entire system is tilted towards benefit to broadcasters. India witnessed proliferation of video broadcast programs, and their down-linking permissions by the Ministry of Information and Broadcasting (MIB). Having charged money for licensing, it became obligatory upon MIB to facilitate their reach to the subscriber eye balls. That required a medium, wired or wireless. The choices were confined to DTH, with limited number of scarce transponders, and CATV networks which had a capacity of 106 RF Channels, if accommodating one program per RF channel, in analog mode, and hence capacity of 106 programs in 47 to 862 MHz spectrum in use in CATV. One solution was to promulgate DAS which would enable encoding (digitization) of content leading to compression (10 to 24 programs per RF channel out of 106 channels). Provision was made to encrypt all content transported over CATV networks, perhaps to avoid a possible criticism that provisions were favoring Broadcasters. Further it would lead to transparency leading to enhance tax ploughs.

4. Thus DAS increased program transportation capacity of CATV networks by encoding and compression. Encryption with encoding (digitization) was imposed for empowering subscriber to select what to watch and pay for programs so selected when billed(itemized).

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5. Maximum eyeballs were glued on CATV networks, which had sizeable connectivity, without any investment from the exchequer, and was backed by an Act and Rules (unlike DTH and TVoIP) with assured audience.
6. In CATV distribution, the entities are Broadcasters, HSP(Headend Service Provider), COs, (Cable Operators),Subscribers and Revenue Authorities. From business point of view, SMS is supposed to be enabler for fair accruals of payments due to all entities, other than Subscriber, who is the principal donor.
7. Broadcasters source the content to HSPs, who aggregate the same at Headends, established by HSPs, and manage transportation of aggregated digital addressable program stream to COs network, upon which the subscribers are located who watch the content and pay for the service, for benefit to CO, HSP, Broadcaster and the Revenue Authorities.
8. At the core, it involves managing requirements of the subscriber, through hardware and software, involving Headend, CAS, SMS , network and viewing device i.e. the STB.
9. CATV services have been in existence over 30 years, MSOs over 26 years and the Regulator over 17 years. In the hindsight, CATV came in existence first and its regulation was necessitated after its inception, tantamounting to after-thought always and every time.

Observations on the Consultation Paper

10. Ref Chapter 1- para 1.2 CABLE (Conductor Attachment Based Electronic Extension of Television) TV had been a technology entrant, by stealth, some time from 1978 onwards, mainly in hotels, for video cassette replays of feature cinema into guest rooms from one control room. Thereafter, with DD services, in SITE experiment, and coverage of Gulf War by CNN in 1991, COs (popularly called LCOs now) , without any formal technical education and financial support (from Govt or financial institutions) started distributing satellite casted video with recorded replays of feature films (to the annoyance of IMPA). Initially 6-8 RF Channels(7 to 8 MHz wide in frequency band 47-862 MHz) were in use in skip channel mode (i.e Channels 1,3,5,7 or 2,4,6,8 and so on) in analog mode, where each program occupied one RF channel space. By the end of 1991, hardware was available to enable adjacent channels transmission in analog mode. All content was FREE to VIEWER. Cable Operators charged an installation fee and a paltry monthly subscription. By the end of 1991, number of channels cable casted varied between 20 to 28. Such systems had over 20 million subscribers availing the service. **First major structural reform** was promulgation of Cable Networks Regulation Ordinance 1994, which got converted into an Act in 1995. This accorded legitimacy to the

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service and led to emergence of HSPs, popularly called MSOs. Being corporatized, and hence organized, they had financial and managerial muscle to change the business style. They prevailed upon then existing COs, with lower capital investment capacity, but with sizeable subscriber base, to close down their rudimentary headends and take aggregated program stream from HSP established Headend , and were promised protection from litigation arising out of copyright violations for net-casting cinema content and up-skilling of technicians. None of these were provided to them. Their established subscriber base saved marketing effort of the HSPs. **Further structural changes** were Amendment 2003 to Cable Act (mainly providing for PAY content and its security by encryption and authorization), appointment of TRAI as regulator for CATV networks and Amendment 2011 to Cable Act. Spectrum in use in Cable TV networks had capacity of only 106 channels, each occupied by one program in analog transmission. With proliferation in video broadcast content, digitalization of transmission was adopted wherein content is digitized, i.e. encoded in binary description, which enabled compression of more than one program per RF channel, out of available 106 Nos) and thus enhancing reach of content to subscriber eyeballs in the networks.

11. Refer Chapter 1 Para 1.3 Cable Act refers to service to subscribers connected on Cable TV networks. While HITS has the drops into subscriber homes through CATV mode, DTH and IPTV , by technical scrutiny, are not video delivered on Cable TV networks.

12. Para 1.4 For a layman like a Subscriber, what is CAS ? Pay TV broadcasters wanted provisions that only subscribers willing to pay for watching their content should be able

What is CAS ?

1. Should NOT have any history of hacking.
2. Generate fingerprint such that it cannot be invalidated by pressing any key on the remote handset of STB.
3. STB and VC to be paired at Head End
4. Integration with SMS for activation/de-activation, keeping logs and generate monthly reports
5. ON AIR upgrade capability
6. Individual addressability of STBs from Headend
7. Handle one million concurrent subscribers
8. System up-time 24x365
9. Tag and blacklist VCs and STBs involved in piracy.

ORIGINAL SIGNAL

ENCRYPTED SIGNAL IN THE NETWORK

CONDITIONAL ACCESS SYSTEM (CAS) implies facility for a VIEWER to access TELEVISION content (which is not offered for viewing without authorization) for which the Headend Service Providers expect PAYMENTS, be BILLED and also be dis-connected on default in payments.

CAS is NOT possible without addressability.

This facility may also be provided on pre-paid basis.

ADDRESSABLE system means a facility to enable or disable a viewing device selectively and remotely from the HEADEND

Prog NOT listed in your selection Contact Customer Care for change in CHOICE

CLICKING PROGS NOT LISTED IN SMS FOR THIS SUBSCRIBER

DECRYPTED SIGNAL WITH STB

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to access the content. Aggregated content carries both FREE TO VIEWER and PAY content. CATV systems are transparent to both whether in analog or digital form. The digital content, however, requires an interface STB(Set Top Box) to undertake D2A conversion to be seen on TV screens. The DVB-CA architecture envisaged end-user access to PAY TV content, as desired by PAY TV Broadcasters, with three elements; (a) program as data(binary encoded form), (b) Viewing authorization for Subscribers through SAS (Subscriber Authorization System) and (c) SMS. Together, they form three layers around the



protected contents. Data scrambling encrypts the digital-TV contents at the centre. The subscriber authorization system executes the data-scrambling element by scrambling algorithms and handling the secured distribution of descrambling keys to viewing devices with authorized subscribers. Knowing which subscriber's entitlement to watch which content, and the subscriber management system delivers access permissions to the SAS for enforcement. The protection scope of the DVB-CA architecture ends at the boundary where protected contents are legitimately descrambled i.e output of STB. Thus, DVB-CA offers no protection when a legitimate subscriber wires up a receiver to tap out the descrambled contents.

13. CAS building block and Functions

(a) **CAS software** the main system is made up of these modules like Scrambler, ECMG, EMMG, scrambler supervision software and so on; the end system is STB with IC card and COS software.

(b) **Server** it runs CAS software, carries out the LAN connection and remote network connection through a SWITCH with multiplexers

(c) **SWITCH** information exchange between server and scrambler through TCP/IP.

(d) **Scrambler** it scrambles and encrypts TS, carries out CA receiving.

14. The CAS server can control many scramblers through TCP/IP interface. STBs conditionally descramble the signals according to commission information of the receiving cards and then finish the charge of digital TV subscribers and other relative management.

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CAS should offer a unique 360° security approach that keeps operators at the forefront of anti-piracy:-

- Legal protection through the prosecution of pirates
- An open communication policy on technology security status
- A continuous monitoring of security risks
- An active participation to major anti-piracy associations. CAS ' solution has to combine its robust smart card conditional access solution for the broadcast of Live DVB programs and on demand content protection solution for VOD content.
- Broadcast grade security provision through CAS vendor's latest smart card generation,
- STB security features including :
 - (a)Trusted STB against control word sharing,
 - (b)Secured loader for software upgrades
 - (c)Secured Personal Video Recorder (PVR) application , and Home networking protection.

15.CAS incorporation, in the Act Amdt 2003, intended to empower subscriber to select PAY programs and pay only for those selected ones. But implementation of the Amendment, though confined only to four metros, remained a sad commentary on implementation capabilities of MIB and TRAI, both. Encryption of PAY content, Subscriber Authorization System and itemized billing by HSP were implied in 2003 Amdt. Later DAS Amdt 2011, primarily, was to enable transport of more than 106 program broadcasters licensed by the MIB over CATV networks. The subscriber empowerment, in vocal discourses, only remained a lip service till 2017. Apparently no PFC(Process Flow Charts) ever seemed to be prepared, or PERTs created to crystal gaze how a well intended system will get compromised on ground. DAS implementation was reckoned only from figures of STBs moved out of HSP warehouses and so reported..

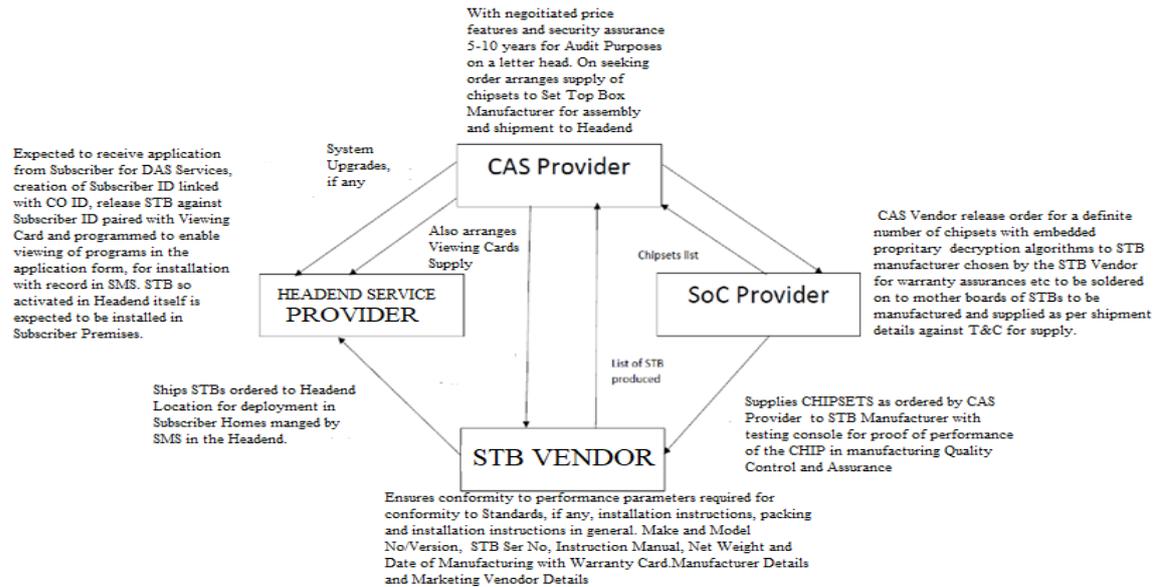
16.HSPs obtained registration from MIB to establish a DAS headend against a fee, without any provision for checking PoP(Proof of Performance) on installation, or even Installation and Commissioning Report, committing conformity to QoS in the Regulations. . With a total void in skilling of personnel in BROADCAST engineering, in general and wireline broadcasting, in particular, Headend hardware is often ordered on suggestions of sales personnel, hardly ever against a formal RFP(Request for Proposal) demanding configuration, supply, installation and commissioning by the CTO(Chief Technical Officers) in the Headends. Orders dwell on Supply, installation and Commissioning (SIC) basis, often without a System Integrator. DVB standards specify layers to achieve addressability. Hardware, manufactured by several vendors have to be integrated to perform to PoP. Even the concept of Addressability, which is nothing but a facility to enable or disable

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viewing of programs selectively and remotely from the Headend is shrouded in jargonized descriptions and confusion confounded.

17. The relationship between key players in DAS sourcing system, as prevailing, is as under :-



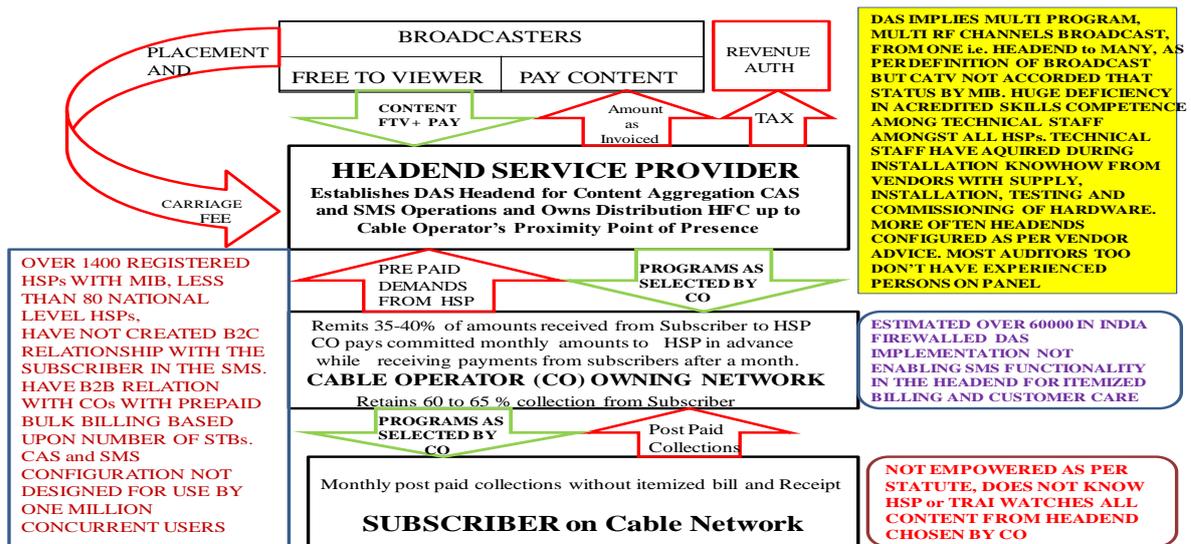
18. Ref Chapter 1-Para 1.5 DVB CA was drafted to provide security to PAY TV content delivery over uni-directional wireline broadcasting networks , like CATV networks prevailing in India (transporting multi-RF channels, multi program, digitally deemed to be digitally addressable, but not accorded status of Broadcast by the MIB). DVB-CA talks about SAS (Subscriber Authorization System) and NOT SMS. Hence it describes manner of encryption, i.e. Common Scrambling Algorithms (CSA1 with 48 bits key, CSA2 with 64 bit keys and CSA3 with 128 bit keys), and decryption with authorization messages (EMMs and ECMs), transported with the program stream, for enabling viewing of content if selected by the subscriber and entered in the SMS. Thus SMS is a software depending upon requirements of the operator of the Headend. Barring a few National MSOs, most MSOs operating within municipal limits (often called Independent MSOs) don't understand difference between analog and digital networking techniques, leave alone computerized management. Most of them think that SMS is just a bill printing software, un-necessarily thrust upon them by the TRAI. Basic requirement for SMS to function is its compatibility with the CAS being installed. Since SMS is mandated and CATV industry is always short of capital, the order is dictated by 'How much discount? And 'How much deferred payment?', both detrimental to Quality, and hence performance. In any case, CATV DPOs are deemed to be combined asMSO+LCO /HSP+CO. But COs, in close proximity to Subscriber, do not consider themselves a joint entity. Hence, they firewalled DAS implementation, in the residential segment served by their network. DAS implementation was reckoned, by TRAI and MIB, from number of STBs shipped out from HSP ware house in bulk to COs, without programming and pairing with Subscriber ID. Hence they became non-addressable, and

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functioned only as D2A converters, enabling access to all content in the program content. COs evolved their own monthly charges figure, to be collected from the subscriber at the end of every month i.e. POST PAID, and paying a part (35 to 40%) of it to the HSP. The HSPs, helplessly knowing this, resorted to bulk billing COs based upon number of STBs issued to them at the rate being remitted by the COs. That's where intended ADDRESSABILITY was thrown to winds.

19. Ref Chapter 1-Para 1.7 There are no multi service operators in India. All headends provide only uni-directional downstream video content. Earlier, National level HSPs had several headends catering to municipal limits of the geographical location with a radius of operation of about 34 kms. This entailed repetitive OPEX. With leasing of dark fibre by TELCOs, a cost benefit has been derived by feeding the same transport stream with a mix of core and edge fibre networking. The relationship between COs and HSPs has remained strained across the country. COs feel exploited by HSPs. COs suffer from lack of elite personality bearing and fluent verbal and written English communication skills. They feel that TRAI listens more to about half a dozen national HSPs and PAY TV broadcasters. Coming to much talked about empowerment of subscribers, no rate cards, or manuals of practice, have been provided to subscribers, their choice of individual program selection has never been exercised, STBs have been sold to them without transfer of lien, HSPs convey bouquets formed by them through COs to subscribers who can hardly comprehend the implications by slimy verbal discourses from the serving technicians. COs introduced the practice of enabling viewing of all content, netcasted from the headend, against a fixed monthly charge without a bill or receipt. Broadcasters, with revised definition of PAY content, as that for which 'HSP pays to the PAY Broadcaster' based upon number of active STBs (since all STBs show all content) have been content with their receipts, in fact against Placement and Carriage fee. De-facto ground reality is as under :-

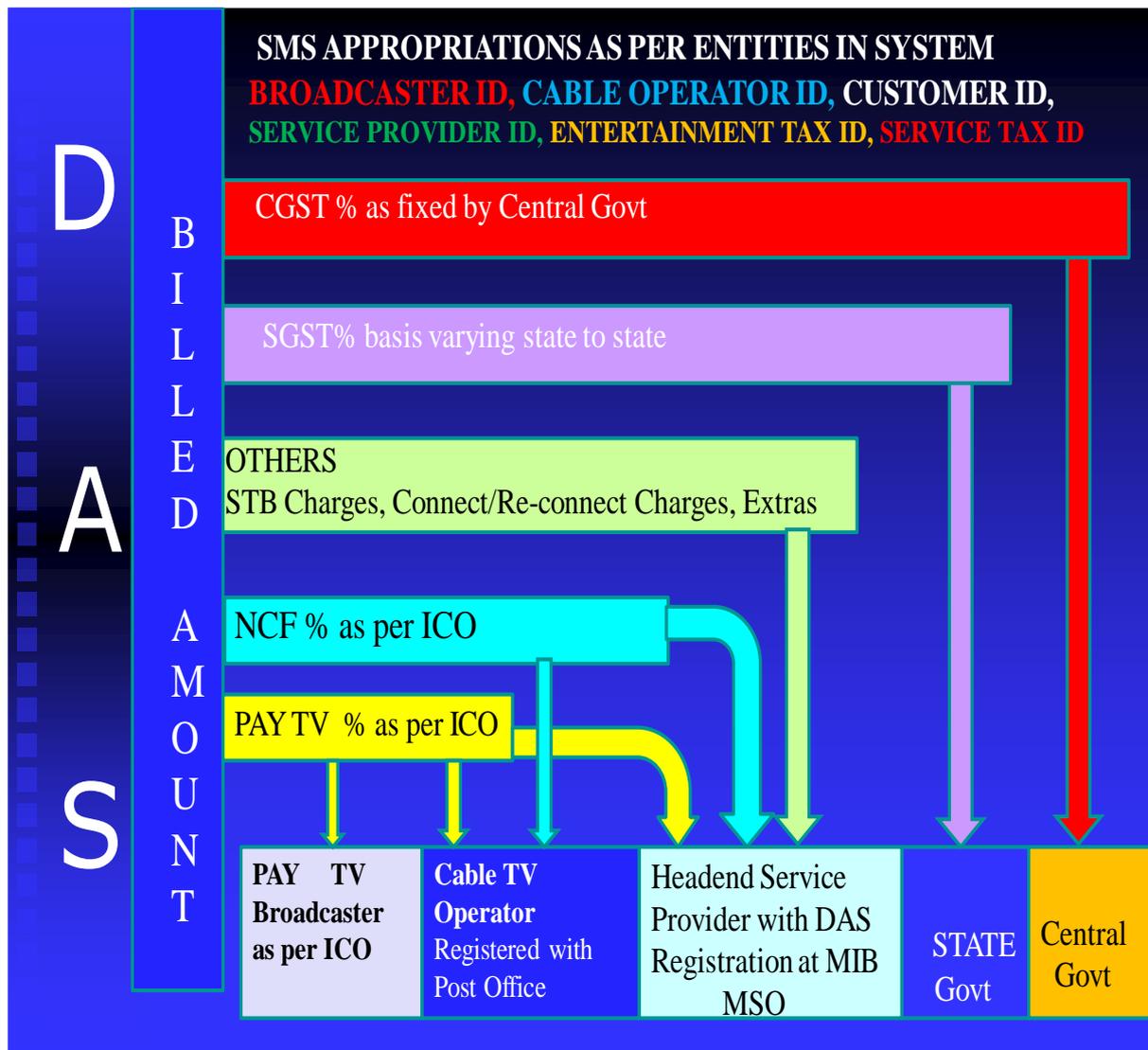


GROUND REALITY IN CATV DISTRIBUTION PLATFORMS IN INDIA

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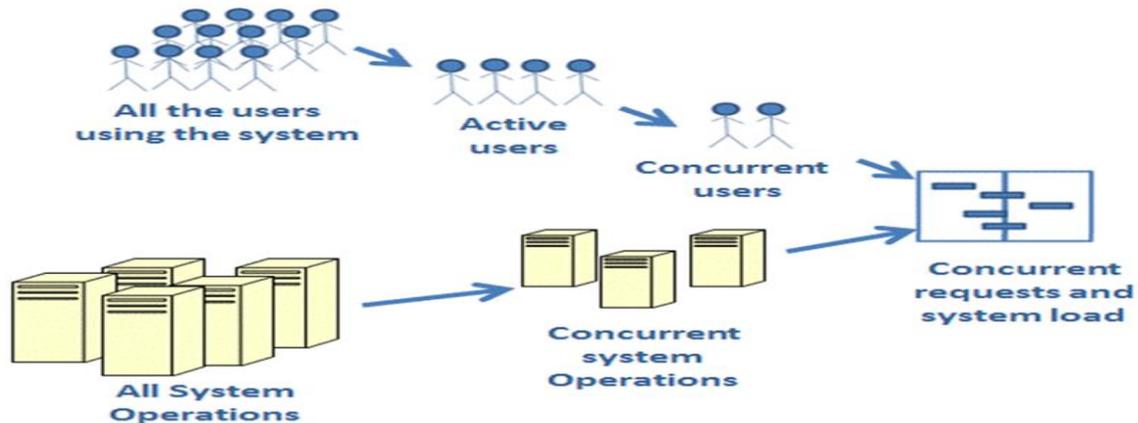
20. Ref Chapter 1-Para 1.9 If DAS is to be implemented, as envisaged in the statute, then SMS shall form the soul in the DAS embodiment. Nowhere in the world is addressable video content delivery SMS has been standardised. SMS has to be envisaged in concept, designed over FPCs and PERTs, compatible with selected CAS, and structured in three distinct functional architectures i.e. APPLICATIONS, DATA BASE and PROXIES. The architecture has to cater for five entities ; Broadcaster, HSP, CO, Subscriber and Revenue Authorities. Funds stem from Subscriber and get appropriated among four entities. Subscriber constitutes the main donor while the other four are supposed to be the recipients in the flow.



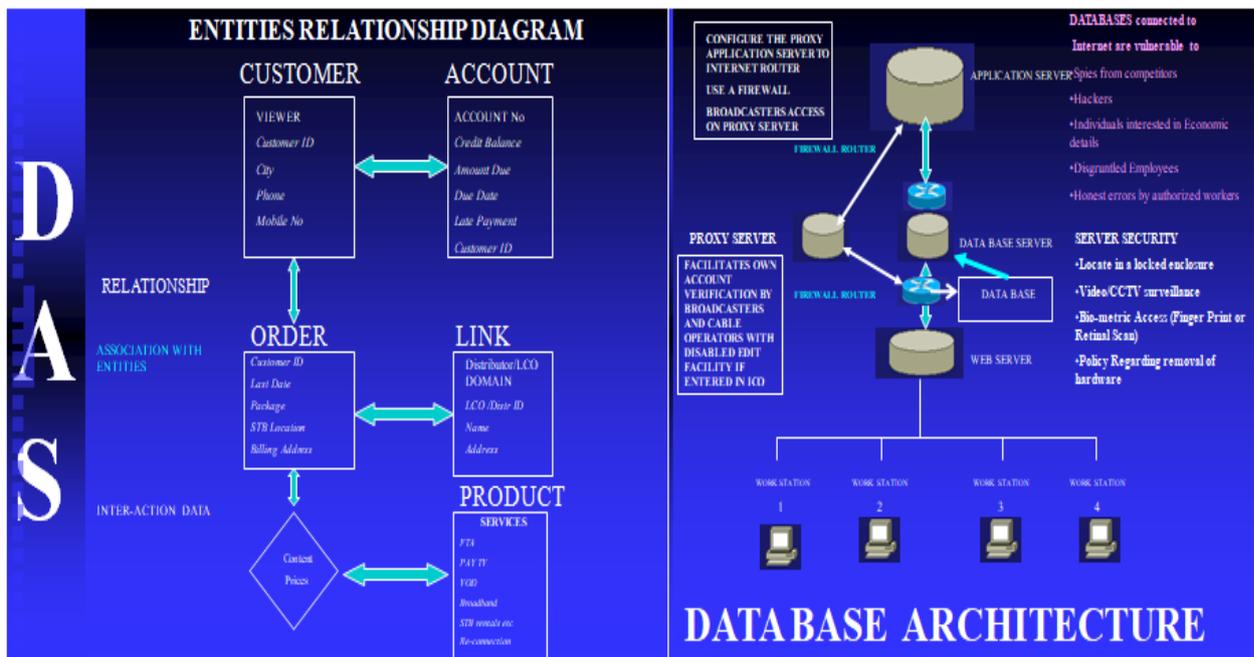
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21. According to regulations, SMS should be capable of responding to one million concurrent subscribers. Most people don't even understand how subscribers are viewed by the system.



22. Entities in the business back bone for the business, Data base is supposed to be dynamic and grants access to COs and Customer Care executives, in Indian Environment where subscribers are not computer savvy. Proxies, with disabled edit rights, enable confidence building by Broadcasters and Revenue Authorities to assess funds flows. Such configurations hardly exist. The Application server requires a bank strong room type security environment too.



23. Hardly any CATV HSPs, while buying SMS, demand the following MIS generation capability and displaying :-

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- (a) No of subscribers on first and last day of the month.
- (b) Average Number of Subscribers in any month.
- (c) No of Active STBs.
- (d) Program wise data of subscriber choices and ordered preferences
- (d) Total amount of Invoiced Receivables.
- (e) Amounts to be appropriated to Broadcasters for PAY Content (including difference, if any in Broadcaster's invoice and amount accrued as per selection by subscribers) and Revenue Authorities for Taxes.
- (f) Details of taxes remitted.
- (g) CO wise details of appropriations from amounts received from subscribers.
- (h) Ageing Reports.
- (i) History/log of each subscriber's interaction with Customer Care.
- (j) Statistical Data on MTTR (Mean Time Taken To Rectify) Customer Complaints.
- (k) No of billing disputes lodged and resolved in any month.
- (l) Reports for MIB
- (m) Reports for TRAI
- (n) Trial Balances for Own Management.

24. While ordering SMS, vendors need to be informed that Software shall have to enable a very rich data model for the subscriber record and provide the following features in its standard release:

- Support for triple play. Easy to setup packages, mixes and channels
- Full support for pre-pay, post pay, PPV, OPPV
- Very flexible and powerful in how packages and price lists are defined and maintained
- Graphical billing tool which allows easy definition of billing rules. Support for daily, weekly, monthly, quarterly or ad hoc billing

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- Multiple utilities to manage a high volume of subscribers, such as batch disconnect, scheduled disconnects, automatic segmentation, email campaigns
- Full generation of all required financial documents. Subscriber balance and VAT calculations are to be generated.
- Warehouse with full S/No tracking of STBs, smart cards, routers, modems, etc.
- Tracking of items installed at customer premises by Serial Nos
- Sophisticated after sales service functionality, including service tickets, jobs and repairs .
- Sales automation with lead tracking and sales force automation
- Call Centre module integration with the telephone switch
- Ability to provide restricted access to content providers, resellers and external partners. Sophisticated delivery channel mechanism ensures that service partners only access the subscribers, subscriptions and jobs assigned to them
- Easily integrate with web site for subscriber login, new subscriber and update subscriber functionality
- Extensive reporting module with multiple ready made reports and the ability to easily create new ones. Reports can be scheduled and sent by email

25. Ref Chapter 1-Para 1.10 Cable Act Rules 1994 pertained to all FREE TO VIEWER environment. When drafted in 1994, neither PAY content was in vogue nor MSOs existed, and hence it did not address piracy aspects for PAY content, whose delivery and security were addressed only in 2003 amendment to Act and Rules. Conditional Access pertains to 'in transit' security of content upto decryption at the Subscriber Premises Interface i.e. STB. Once a device like STB has decrypted the content, its further dissemination is NOT in the ambit of CAS. DRM does not entail security of content, being a TELCO domain practice, but because of its earlier adoption by TELCOs, whose networking is bi-directional, can track access and usage, in terms of Who, Where and When details if copying is permitted. Hence DRM is different from CAS. DRM, in spirit, implies live bi-directional communication system to be effective. In the hind-sight it appears all regulations aim at benefit to broadcasters rather than the subscribers. The spirit of all consultation remains confined to safeguarding PAY Content in general and ploughing taxes.

26. This paper is not bringing out the most significant shortcoming of the CATV DPO services. There are about 1300 plus registrations granted for DAS headend establishment. Out of this number, leaving about a 150 corporatized HSPs, others have voids in financial muscle, management acumen and technical knowhow. This category comprises of neo-HSPs who have pooled money to try and become HSPs themselves. They lack detailed knowledge of how DAS works or what does it

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involve (Merits of a good headend layout with Headend Monitoring System, i.e. HMS, and Network Monitoring System, i.e. NMS, alarms requirement, security of CAS and SMS, establishment of Customer Care, documentation such as Manual of Practice and itemized billing, appraisal of COs and upskilling of their technicians and redundancy management in the headend? With financial constraints, they start with forming a group, arranging accommodation to house the headend, contact interface with vendors who start thronging around them the moment the registration is granted with least concern about QoS or PoP parameters. In any field sales people seize an order, as a feather in their reckonable performance, get some advance and pass it on to installation team to execute. The vendors, sometimes as a cartel, recommend cheap and sub-standard CAS and SMS. The buyer's don't dictate the requirement. They order what is suggested and mostly sub-standard. How can sub-standard be expected to perform to standards?

27. Finally what should DAS have meant to the subscriber? (a)Explanation by most familiar face, the Cable Wala Technician, that (i) With DAS mandated, Subscriber requires a device called STB to view programs now, (ii) Service has to be applied for on an application form (SAF) to obtain the STB (iii) Under new rules the subscriber has to select which program to watch from a rate card, prepared by HSP and shown to the subscriber (b) Some programs are free to viewer and some have to be paid for, as filled in the form, (c) STB is to be paid for by subscriber (d) STB will be issued by the HSP and installed by Cable Wala (e) After installation Subscriber ID will be intimated to the Subscriber (h) After Installation of STB itemized bills will be issued and (i)subscriber will be provided 18x365 customer care from Telephone Numbers intimated. Suggested format for itemized billing for CATV subscribers would be as under :-

CATV SERVICES BILL																																																																													
<div style="border: 1px solid black; padding: 2px; width: fit-content;">LOGO</div> <p>Headend Service Provider NAME, Headend Location Address , Contact Details</p> <p>MIB DAS Headend Registration No CGST No SGST NO</p> <p>SUBSCRIBER DETAILS Subscriber ID _____ A/C No _____ Name _____ Billing Address _____</p> <p>Address where STB is installed _____ No of STBs Installed _____ Ser Nos : STB 1 _____ STB 2 _____ STB3 _____ STB 4 _____ Viewing Card Nos _____ STB 1 _____ STB 2 _____ STB3 _____ STB4 _____</p> <p>BILLING SUMMARY</p> <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:15%;">Previous Dues</td> <td style="width:15%;">Payments</td> <td style="width:15%;">Adjustments</td> <td style="width:15%;">*Current Charges covering all STBs</td> <td style="width:15%;">Total Amount Due</td> <td style="width:15%;">Amount Payable After Due Date</td> </tr> <tr> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> </table>	Previous Dues	Payments	Adjustments	*Current Charges covering all STBs	Total Amount Due	Amount Payable After Due Date	_____	_____	_____	_____	_____	_____	<div style="border: 1px solid black; padding: 2px; width: fit-content;">Cable Operator ID</div> <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:50%;">Bill Date</td> <td style="width:50%;"></td> </tr> <tr> <td>Bill No</td> <td></td> </tr> <tr> <td>Total Amount Due</td> <td></td> </tr> <tr> <td>Due Date</td> <td></td> </tr> </table>	Bill Date		Bill No		Total Amount Due		Due Date																																																									
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ACCESS SYSTEM(CAS) and SUBSCRIBERMANAGEMENT SYSTEM
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Lt Col VC Khare (Retd), Cable TV Industry Observer

28. The subscriber had to be clearly explained that existing practice of watching all programs against a monthly subscription has to cease with DAS, enacted to empower the subscriber.

29. As against this what happened in customer acquisition was :-

Ser No	As Implied in Policy Documents	As implemented in Reality	Remarks
1	Subscriber to apply for DAS Service with Subscriber Application Form (SAF) including first time choice of programs PAY and/or Free to Viewer (FTV)FTV	Subscriber already existed on Network prior to Nov 2011. Hence NOT done	
2	SAF on submission through CO and receipt in Headend , Subscriber ID creation	NOT done since neither SAF was filled nor subscriber appraised about DAS empowerment for selection of programs from a rate card prepared by HSP.	
3	On allocation of Subscriber ID, linked with CO ID, STB release ordered on the warehouse, programmed to view choice of programs indicated in the SAF and prepared for installation.	Not done	
4	STB paired with viewing card (VC) for carded systems, Subscriber ID with CO ID, prepared for viewing programs selected by Subscriber, checked and packed for despatch to CO for installation duly labled with Subscriber ID and other demographic details. CO informed for collect STB	Not done	
5	STB picked up by CO for installation	STBs without particular allocations or programming issued in bulk to cable operators to charge money and install..	
6	Particular STB taken to Subscriber premises for installation by technician with CO and installed	These STBs, since NOT programmed, enabled viewing of all content net-casted from Headend	
7	After installation, Headend informed about date and time of installation for service and billing to commence	Deemed installed by HSP. Authorization details NOT entered in SMS for itemized billing to commence.	
8	After reported installation service to start with itemized bill generation by HSP for Subscriber.	Not done since subscriber details not punched in the SMS. COs charged a fixed monthly subscription without itemized bill or receipts.	HSPs bulk billed COs rather than Subscribers on pre-paid basis
9	Computerised appropriations of amount paid by subscribers to entities in business model (Broadcaster, HSP, CO and Revenue Authorities)	COs remitted a part of collection from subscriber to the HSP who issued bulk invoice upon CO on per issued STB count to COs on pre-paid basis.	MIB and TRAI remained silent spectators to the variation.
10	DAS proclaimed implemented as legislated	COs firewalled DAS implementation in networks owned erected and operated by themselves customizing service fulfilment to their own evolved practice.	MIB and TRAI both lack on ground enforcement mechanism.

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30. Standardization for CATV is confined to Bureau of Indian Standards(BIS), who formulate standards for hardware to be used in the DPO. This activity is undertaken on directions from MIB or TRAI. The standards pen down tangible parameters for guiding industry, in India, to manufacture hardware to those standards, and users to install hardware CONFORMING to those standards, not mandating certification of AS BUILT system. This is so because ERTLs are NOT familiar with test setups and most of the hardware in use is of foreign origin. This is why Cable Act suggested **conformity**, which shifts burden of 'Proof of Performance' upon the Headend Service Provider. Unlike DTH, where earth station undergoes approval with WPC and NOCC, CATV headends are NOT subjected to any performance checks. The practice is confined to delivering clear PICTURE on SCREEN and audio in subscriber premises. Being unorganized, and exploiting lack of enforcement mechanism with TRAI and the MIB, the industry evolves its own practices, often contrary to Act Rules and Regulations. Any rudimentary study will reveal that (a) DAS implementation was reckoned from number of STBs shipped out of HSP'S ware house and (b) firewalling in the CO segment following own conveniences.

31. In such a scenario, what sort of framework is the authority envisaging without upskilling the technical staff in the Headend and last mile ? For technical compliance, first and foremost, understanding of network characteristics has to be imparted to operators with appraisal on dangers arising out of violations.

32. If the authority thinks that creating empanelled auditors will pave the way, they may be very far from the truth. The emphasis is clearly more on subscription audit and applicants appear to have been selected more with vision on IT and Cost Accountancy. There is a requirement of an engineer on the panel, without even mentioning which discipline in engineering. Ridiculously the person could be BSc (Animal Husbandry). There is hardly any engineer on the panels approved known to have designed, ordered, installed, tested and commissioned a DAS headend, as a show piece in the country for people to emulate.

32. Answers to Questionnaire

Q1. List all the important features of CAS & SMS to adequately cover all the requirements for Digital Addressable Systems with a focus on the content protection and the factual reporting of subscriptions. Please provide exhaustive list, including the features specified in Schedule III of Telecommunication (Broadcasting and Cable) Services Interconnection (Addressable Systems) Regulations, 2017?

Refer to paras 12,13 and 14 above for CAS and 22, 23 and 24 above for SMS.

Q2. As per audit procedure (in compliance with Schedule III), a certificate from CAS / SMS vendor suffices to confirm the compliance. Do you think that all the CAS & SMS comply with the requisite features as enumerated in question 1 above? If not,

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what additional checks or compliance measures are required to improve the compliance of CAS/SMS?

It is very clear that audit procedures, as drafted, aim at fulfilling documentary formalities and creating an impression that audit has been done as contracted. The emphasis is more on attaching list of documents rather than checking compliance, advising infirmities and getting the infirmities firmed up. If just attaching letters of conformity, from vendors, and enclosing them with the report is going to fulfil the requirement, then in Indian environment, compliance will be the easiest to accomplish.

TRAI should consider getting a demonstrative audit done by some experienced person for the best headend, in their opinion, in the country by all empanelled auditors, one by one, at different times, and then by a professional, known for having established headend conforming to DAS requirement, and educate the engineers in such listed audit firms to learn how to audit a DAS headend.

Q3. Do you consider that there is a need to define a framework for CAS/ SMS systems to benchmark the minimum requirements of the system before these can be deployed by any DPO in India?

Uni-directional video content delivery in residential segment in India is NOT considered highly technical or professional. Internationally too, DVB and ATSC have formulated concepts and standards for content protection. Nowhere in the world is SMS for video delivery standardised. SMS vendors have to be ordered what to install, configure and enable, with liability for defaults and legal implications. 95% of service providers, in India, think that SMS is just a bill printing software. In any case itemized bills, like shown in para 27 above, for subscribers are NOT being generated.

Q4. What safeguards are necessary so that consumers as well as other stakeholders do not suffer for want of regular upgrade/ configuration by CAS/ SMS vendors?

Clearly documented RFP, Installation and Commissioning reports with screen shots of about 30 screens required for obligations in DAS implementation, appraisal of subscribers and survey with subscribers to complete questionnaire drafted for QoE (Quality of Experience).

Q5.

(a) Who should be entrusted with the task of defining the framework for CAS & SMS in India? Justify your choice with reasons thereof. Describe the structure and functioning procedure of such entrusted entity.

SCTE India, SCTE UK or Cable Labs USA

(b) What should be the mechanism/ structure, so as to ensure that stakeholders engage actively in the decision making process for making test specifications / procedures?

Support your response with any existing model adapted in India or globally.

Creation of Committee of experienced persons from the field be it vendors, system integrators, Installation, Commissioning and Testing Engineers by TRAI.

Q6. Once the technical framework for CAS & SMS is developed, please suggest a suitable model for compliance mechanism.

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(a) Should there be a designated agency to carry out the testing and certification to ensure compliance to such framework? Or alternatively should the work of testing and certification be entrusted with accredited testing labs empanelled by the standards making agency/ government? Please provide detailed suggestion including the benefits and limitations (if any) of the suggested model.

ERTLs, the trusted laboratories in India are not geared up for system performance checks. They can at best certify individual pieces of hardware. They don't have any simulators or test setups for opining on multi-RF channel, multi-program DAS networks.

In India Standards are drafted by BIS for conformity. This organization too lacks enforcement and take cognisance when complaints are addressed. For Hardware installed in the network, performance parameters are already specified. Any headend should have link budgeting calculations to meet EoL specifications and practices in place to conform to those parameters. Audits should bring out conformity to policy statements of Service providers.

As far as SMS is concerned, RFP and Commissioning reports should authenticate conformity or violation.

(b) What precaution should be taken at the planning stage for smooth implementation of standardization and certification of CAS and SMS in Indian market? Do you foresee any challenges in implementation?

Precautions emerge from structured scrutiny of implementation. It is primarily evolved from deviations scrutiny, listing maladies and arriving at remedies. CATV DPO is, a multi-channel, multi-program digitally addressable broadcast over wireline medium. But is not accorded the status of Broadcast by MIB. How can outcasts be expected to conduct exemplarily?

The challenge is in imparting education and upskilling by laying down minimum academic qualifications for employability in the segment.

(c) What should be the oversight mechanism to ensure continued compliance? Please provide your comments with reasoning sharing the national/ international best practices.

Start with listing of Documents required at installation and commissioning (As built drawings with design compliance), scrutiny of periodic checks and modifications and annual technical audits.

Q7. Once a new framework is established, what should be the mechanism to ensure that all CAS/ SMS comply with the specifications? Should existing and deployed CAS/ SMS systems be mandated to conform to the framework? If yes please suggest the timelines. If no, how will the level playing field and assurance of common minimum framework be achieved?

Technical audits of all registered Headends should be got conducted, deviations recorded, time given to remedy the malady or face closure of business. This could take about four months per headend.

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Q8. Do you think standardization and certification of CAS and SMS will bring economic efficiency, improve quality of service and improve end- consumer experience? Kindly provide detailed comments.

No ! unless (a) enforcement mechanism is established at MIB or TRAI (b) upskilling of trade personnel in CATV is organized and (c) penal provisions for detected violations are made..

Q9. Any other issue relevant to the present consultation.

(a) The saga of addressability implementation, basically, now appears for benefit of PAY Broadcasters. If PAY TV is prohibited and DAS confined to digitization without encryption, but with Subscriber Management, purpose of empowerment of Subscriber shall be achieved. That would require amendment in Cable Act, Rules and Regulations. Even the issue of interoperability will get addressed.

(b) Being a paper on technical performance, there is a need to use right connotation for 'CHANNEL' which technically refers to a ' 7 or 8 MHz wide strip in RF band 47-862 MHz'(and not the content of any broadcaster) in the television broadcast, which, in the glossary of Cable Act, is described as 'Program' i.e. (a) exhibition of films, features dramas, advertisements and serials through video cassette recorders or players and (b) any audio or visual or audio-visual live performance or presentation, and the expression programming service is to be construed accordingly. Further the MPEG protocols for headend also mention PMT (Program Mapping Table) and PAT(Program Allocation Table), not CMT (Channel Mapping Table) or CAT (Channel Allocation Table). Initially in Analog netcasting, every program occupied one RF channel; thus leading to ill informed connotation '**Channel**'. Technically **Program and Channel are not synonymous**. This has been pointed out several times, in my comments to the Authority. But either this is NOT being understood or forbearance continues to prevail.