Indigenous Development And Manufacturing of STB, SMS and CAS

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Topics of Discussion:

- Introduction and STB Ecosystem
- Need for Indigenous Design and Manufacturing of STB, SMS, CAS
- The challenges
- The path towards Indigenization of Design and Manufacturing base.
- Conclusions

STB: Introduction and Context

- A set-top box, in its simplex form, is a customer Premise Equipment (CPE) that allows a digital signal to be received, decoded and displayed on a television.
- The set top box also converts the digital signal to an analogue signal so that an older television can display the programs.
- The signal can be a broadcast signal (and/or Internet data) and is received via cable or Satellite dish Antenna or other physical medium.
- Set top boxes enriches the TV viewing experiences through fruits of digitization.
- Today, some STBs have two-way communication, allowing for interactive features.
- **In June 2014, STB has been notified as a Telecom Equipment by Govt. of India.**

CAS : The Security Module

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- A Conditional Access System is a subsystem that is used to limit the access of TV signals to only authorized viewers.

- At an industry level, it tackles the issue of addressability that has been a problem in India with gross underreporting of cable homes by operators. This also opens up a whole new paradigm.

- At the core of CAS, is the encryption/decryption engines based on cryptographic algorithms.

- CAS is implemented as a combination of Hardware and Software.

CAS has two parts:

  - One Part is in Headend (Content Scrambling & Key Encryption)
  - Other Part (Complementary Part – Descrambler & Decryptor) is in Receiver (STB & Smart Cards)

SMS : Subscriber Management System

The SMS is a subsystem that stores and manages details of each subscriber, and the TV channels that are subscribed to by the subscriber. SMS interfaces with CAS.

Typically, SMS is an application hosted on a separate server in the Headend. These days cloud based SMS are also getting popular.

Generic features of SMS are:

- Customer details such as mobile number, address, STB ID etc
- Customer subscription details
- Bill payment details
- Total number of subscribers – area wise.

STB Ecosystem

Sl. no	Parameter		Remarks
1	Number of Household TVs in India	183 millions out of 250 millions homes in the country has TV.	TV penetration Increasing at a rate of around 19% to 20%
2	Percentage of Single TV houses	96.5%	Trend is towards multiscreen (independent screens) TV homes in near future.
3	Types of TV connectivity	35% - DTH 63% - Cable (with digitization, moving towards complete digital) 2% - Terrestrial – Also moving towards digitization.	Life of STBs (especially in cable segment) is badly effected by low quality imports and electronic dumping. Also leads to e-waste.

This implies, there is a huge requirement of STBs (around 100 million more) in the country presently and also in the near future.

Sources: Broadcasting Audience Research Council (Barc) Survey

STB Ecosystem

- With rollout of National Optical Fibre Network (NOFN), there is large requirements for STBs, specifically for the IP connected variants (OTT – Over The Top STB).

- In Near Future, with convergence and connected ubiquitous & pervasive machine intelligence, Set Top Boxes will also emerge a information/content home gateway rather than a plain independent customer premise equipment for reception of linear content.

- There is huge opportunity for export of set top boxes, as other countries take up the digitization of broadcast content delivery. India can be a dominant player in supply of set top boxes to these countries.

This implies, there is a large requirement & scope for innovation, design, development and subsequent manufacturing need for STB in the country.

STB Segments and Varients:

- Cable STB
- Satellite based DTH (Direct To Home) STB.
- IP based OTT STB (Non Linear TV)
- Terrestrial STB
- Hybrid STB (Cable+IP, DTH+IP) : Providing reverse channel to realize innovative applications.
- Universal STB (Media Agnostic Content Delivery/ Reception)
- True Converged Service delivery intelligent Platform.

STB connectivity for Different Segments

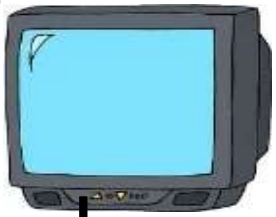
DTH Connectivity

MSO

Cable Connectivity

LCO

Analog TV with RCA interface



High Speed Modem / ONT

OTT Connectivity

STB

LCD TV with HDMI interface

OLT

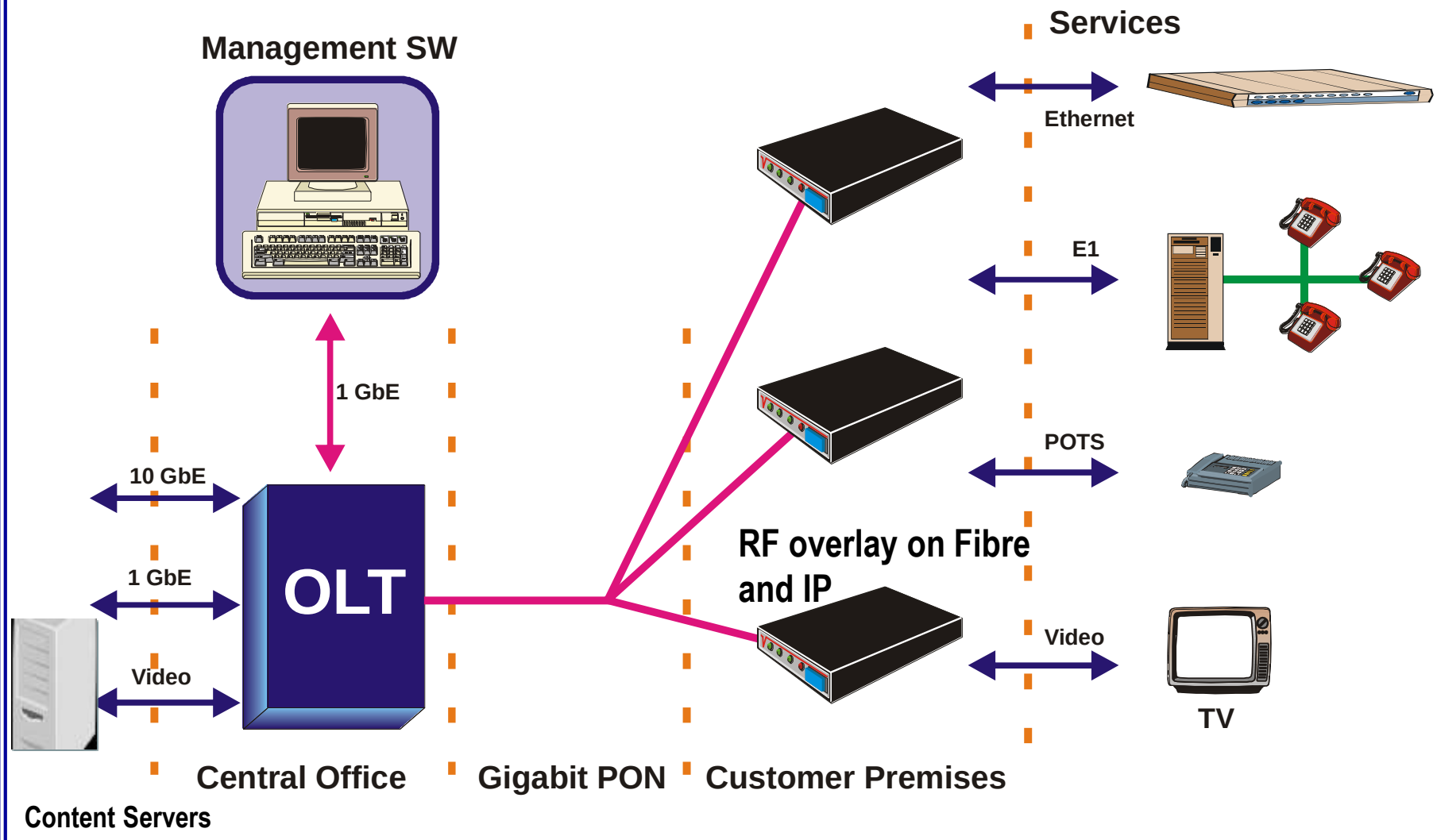
Internet

Service Provider IP cloud

IP TV Servers

Content Servers

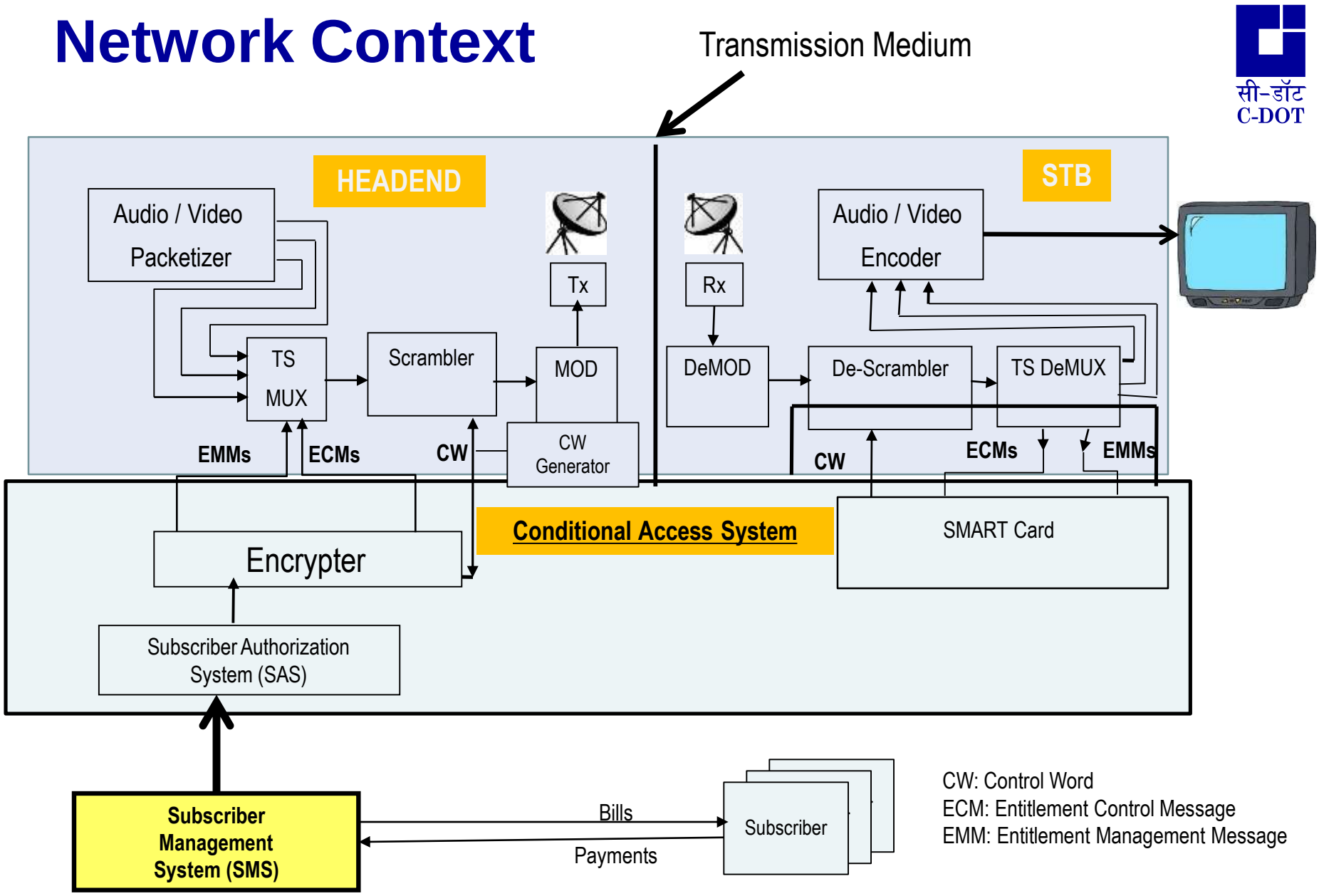
ONT integrated STB in GPON



Segments and Services

- There are 6/7 DTH players in the country including DD Direct Plus.
- Many MSOs – Few Thousands with varied sizes and customer base. With DAS implementations, many MSOs came to existence.
- IP based OTT STB (Non Linear TV) : International players such as Netflix, Hotstar etc.
- Terrestrial STB : As per TRAI mandate, digitization of terrestrial transmission also to be completed by 2023.

Network Context



Need for Indigenous Development and Manufacturing of STB

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- Presently a sizeable percentage of STBs are imported to India from China, Taiwan etc.
- Indigenized STB can pave the path to achieve “Target NET ZERO IMPORTS by 2020” under pillar 7 (Electronics Manufacturing) of **“DIGITAL INDIA”** program. It will boost manufacturing segment in India and is an enabler towards “**MAKE IN INDIA”** program of Govt. of India.
- With the Design and Development initiative for STB (and related network elements) in India, innovation will take place and will enable generation of Indian IP in this technology/product vertical.
- This will provide the necessary impetus to product design ecosystem and reduction in product cost in the country, improves product/service quality and will also reduce the dependency on foreign vendors.

Need for Indigenous Development and Manufacturing of STB

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- Reduction in e-waste with better quality locally manufactured STB.
- This provides an impetus for participation of larger number of manufacturing industries in STB segment.
- With indigenous development & manufacturing base for STB, the service and repair for those this will certainly be a value proposition towards **"SKILL INDIA"** initiative. Presently the servicing/repair of STBs is not enabled in India due to lack of technical know how.
- Also with an indigenous & interoperable regime, it will encourage development of innovative 3rd party applications and will be a firm step towards **"START-UP INDIA"** program of Govt. Of India.

The above value propositions get further manifested more meaningfully, with the proliferation of **indigenous and interoperable** STBs presently being developed by **C-DOT as knowledge partner to TRAI.**

The Challenges

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- STBs as on today, are rigid verticals of many stakeholders with no horizontal compatibility. Major stakeholders are SoC, CAS, Operator, Middleware etc.

- Due to lack of horizontal compatibility, the manufacturing base is a completely closed ecosystem and witnessed limited growth in the country and dependency on foreign vendors.

- India does not have the local SoC base, STB SoCs are mainly from US, Taiwan and China.

- As of now, there are only a very few CAS solutions from India and are predominantly driven by US, Europe and China (lower end variants).

- As IP generation is minimal (almost Nil) in India, there is minimum local developmental initiative and resulting in direct imports of the STBs and other network elements.

- India has good number of SMS (Subscriber Management System) providers and few Middleware providers aligning to vertical ecosystem of the day.

Towards Indigenization

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Short Term Solution

Typically STB consists of the following modules/components:

Hardware:

- Main SoC
- Memory
- Tuners & Other active components
- Passives, PCB, Cables
- Enclosure
- IR Remote

Software:

- CAS
- Middleware , Other Software modules
- SMS (as a Headend element)

Towards National & Strategic Needs

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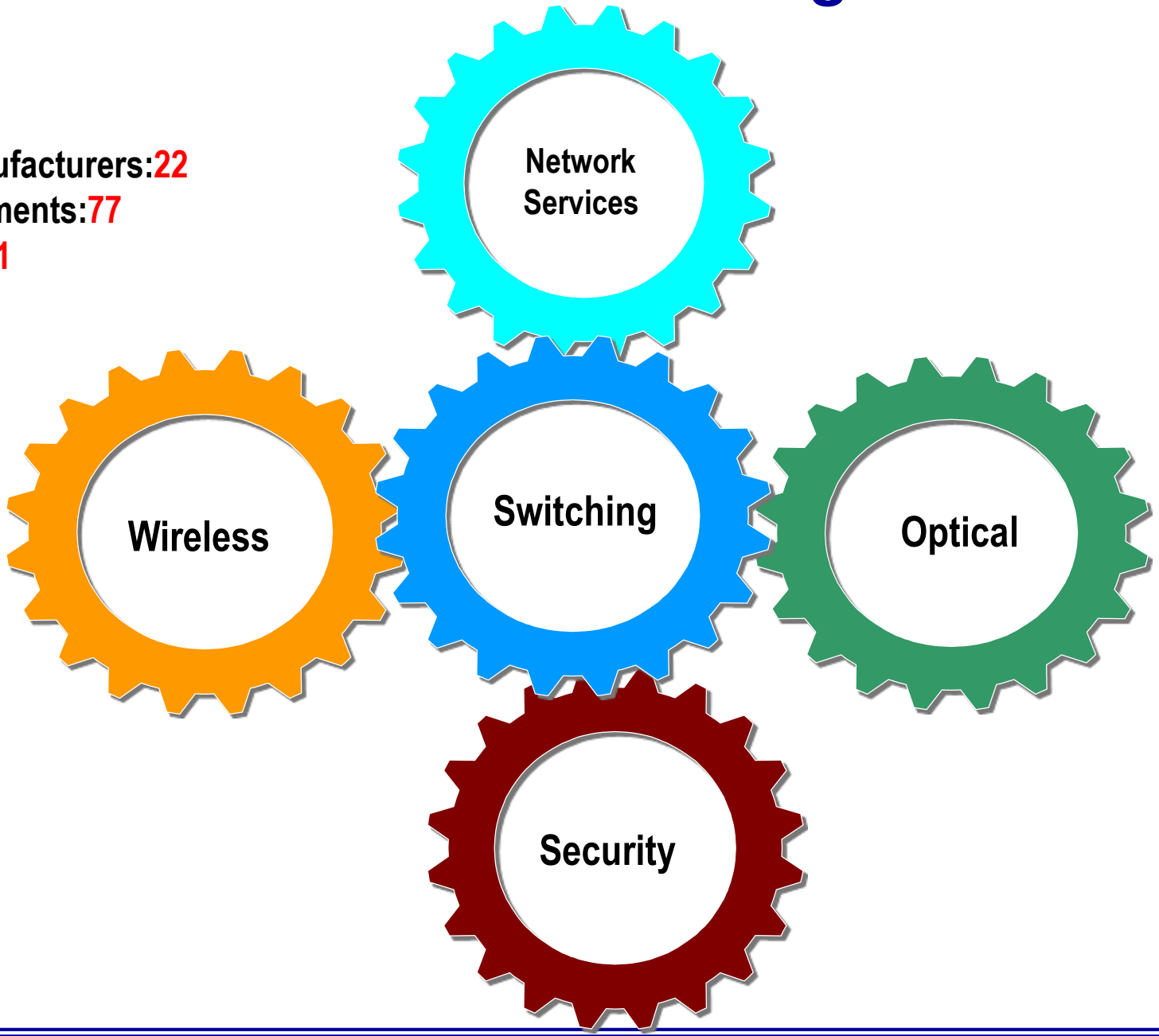
CDOT Manufacturers:22
TOT agreements:77
Products:21



R&D to Manufacturing through Transfer of Technology

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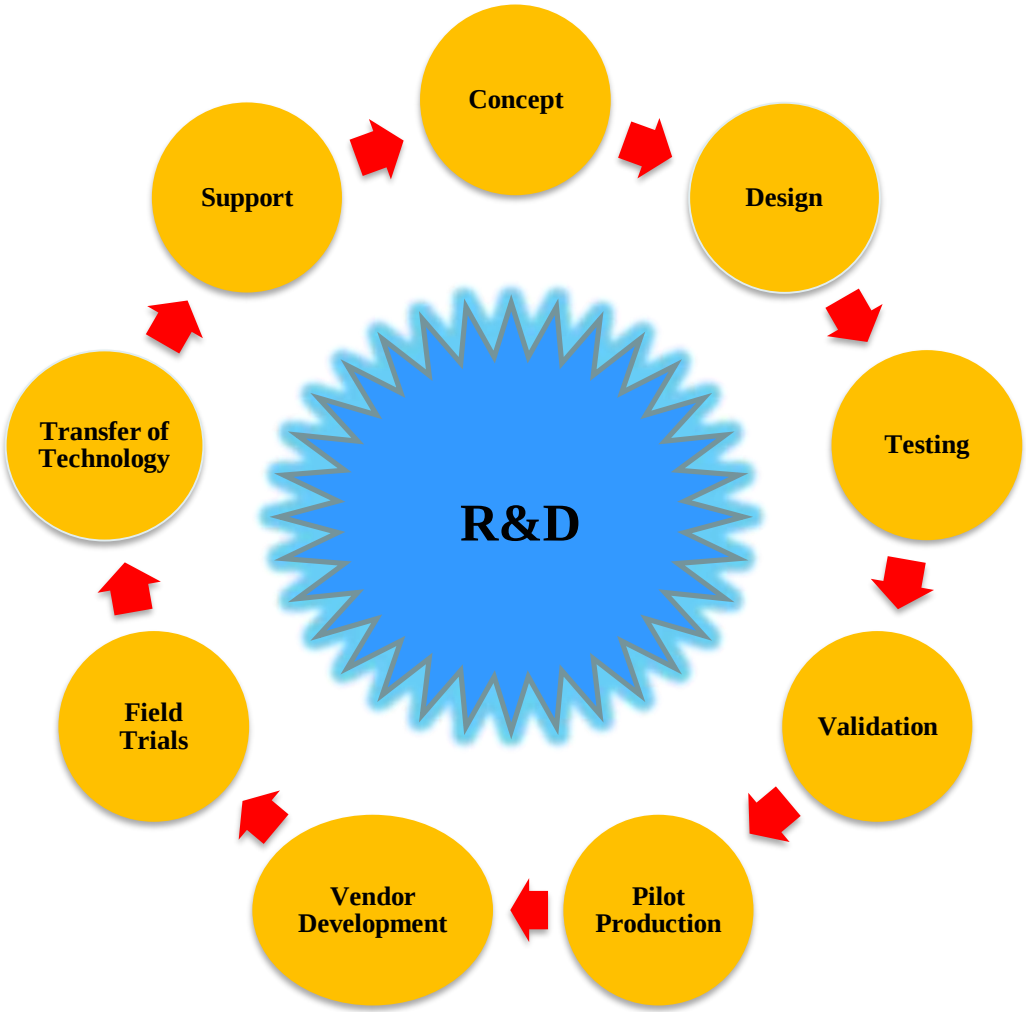
- Manufacturing Process
- Technology Certification
- Materials and Inward logistics
- Quality of Production
- Production testing
- Electronic Packaging
- Outward logistics
- Field support
- Product Roadmap
- Marketing & Promotion



C-DOT STB Interoperability Solution

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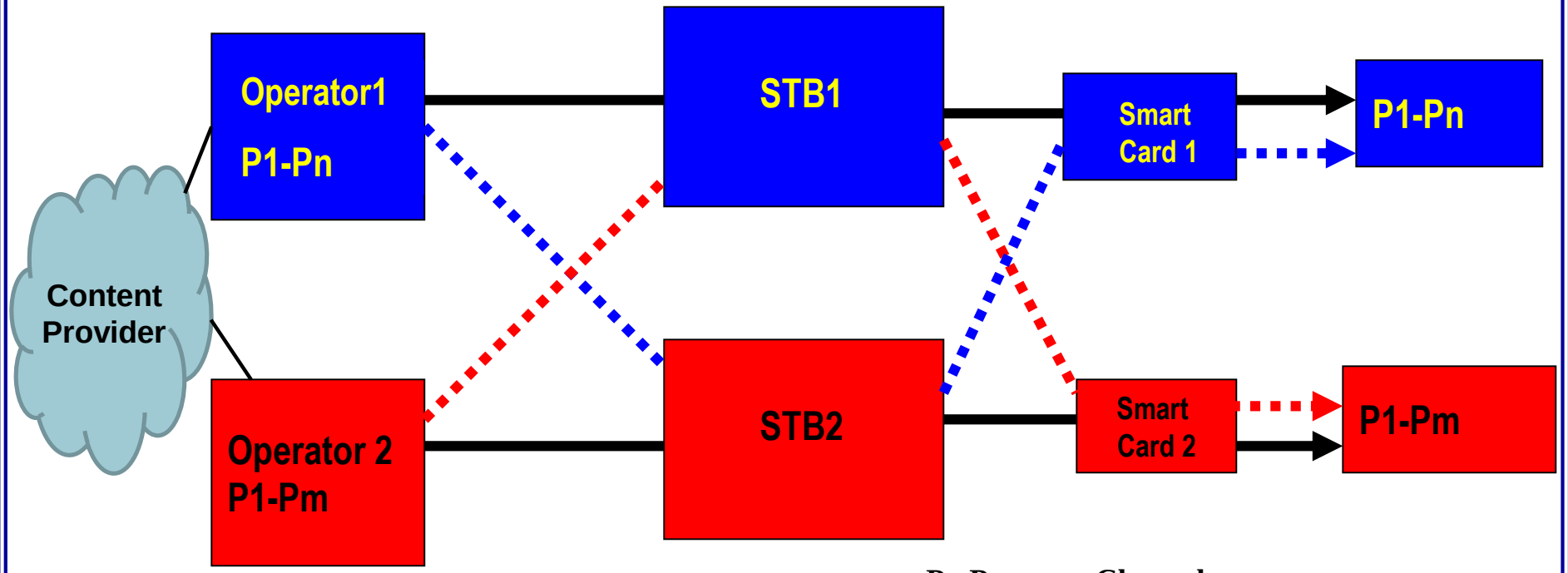
C-DOT is working as Nodal Knowledge Partner to TRAI for STB interoperability



P : Program Channels

Operator Specific Smart card with Interoperable STB augmented by mobile network based OTP

Conclusions

- Indigenous Design, Development and manufacturing of STB is a must and also a Big opportunity for Indian Industries.
- This needs to backed by Indian Specifications and certifications.
- India needs to adopt a phased approach towards reaching the goal of total indigenization of STB and other network elements.
- To start with, local design, then move towards interoperable framework and finally towards a local design of SoC and all modules.

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Thank You.

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Short Term Solution …

❖Maximizing the usage of indigenous active and passive components (other than main SoC as of now), cables, enclosure and software modules including CAS and indeed the *"DESIGN".* These will enable local manufacturing of STB.

❖Initiate setting up of support/repair centers for STB in the country.

❖Setting up of certifying agency by Government for quality and compliance check.

❖BIS certification is only for the safety requirements, there is no compliance certification as on date, in the country. More structured certification is needed towards a proper quality control and compliance to stop electronic dumping.

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Mid Term Solution (12-30 months):

- To field proliferate the indigenous interoperable STB framework to enable the manufacturing boost and reducing the e-waste along with short term measures as discussed.
- Increase the percentage of local modules & components in the design.
- Evolve Indian Specifications addressing the Indian contexts and needs.
- Operationalize meaningful support/repair centres across Pan India.
- Encourage entrepreneurship towards development of 3rd party software modules and applications. Generate more Indian IP.

- This will reduce foreign vendor dependency and lock-in.
- Enable horizontal compatibility and growth
- Enable more home grown CAS and middleware
- As India has a huge market, customized silicon complying to Indian standard will evolve

Towards Indigenization

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Long Term Solution (3 to 5 years):

- **In the long term, it is mandatory to locally design and develop STB SoC.**
- As the building blocks of STB SoC are very much standardized, it can start with development of IP cores and physical realization can begin with FPGA based design.
- ASIC development to start in parallel for faster ASIC rollout.
- Target STB design with 100% indigenous components driven by Indian IP.
- Develop local DRM (Digital Right Management) solutions.

This will enable the true sustainable Indigenous STB ecosystem for development and manufacturing in the country in the long run and will also ensure dominance in this technology/product domain.