

Case Study

Actus Implements the world's largest Broadcast monitoring system

Electronic Media Monitoring Centre of India, Ministry of Information & Broadcast, Govt. of India (Broadcast Regulator)

"...This is our third generation monitoring system. We started 10 years ago with a manual system based on VHS tapes, we modernized 5 years ago with an Indian based system who took us to the digital age with an Analog based system, and now we have implemented a fully digital system from Actus Digital, that is IP based, with instant access time, and state-of-the-art features such as automatic content detection, speech to text, integrating our workflow and scalability to handle 1500 channels and 500 users."

EMMC Background

The Indian Central Monitoring Centre was set up during the World War II to monitor anti-war propaganda, carried out by various international radio programs. Later, the Centre was shifted to its new complex at Aya Nagar, New Delhi in 1981 and renamed as Central Monitoring Services (CMS). It was brought under the direct control of Ministry of Information & Broadcasting in 2003. In addition to other works, CMS was monitoring content aspect of TV channels to look into the violation of Program & Advertising Code under Cable Television Networks (Regulation) Act, 1995. Some of the technical aspects of CMS activities were transferred to National Technical Research Organization (NTRO) in 2005. While the content monitoring were transferred to EMMC with the setting up of the Electronic Media Monitoring Centre (EMMC) in 2008 under the Ministry of Information and Broadcasting, to monitor the content aspect of TV channels and report on violations of Program and Advertising Code.



The Actus system is installed at the 10th floor of the Sookna Bhawan¹ building in New Delhi.

Mission

EMMC received from the Government of India, Ministry of Information and Broadcasting, the mission to have effective monitoring of content of various TV channels and Radio stations beaming over Indian Territory for any violation of:

- Program Code
- Advertisement Code
- Various provisions of Cable Television Networks Regulation Act, 1995

¹ Sookna Bhawan = Information Building

The Challenge

EMMC has been entrusted with the work of monitoring the contents of all TV channels and Radio stations up linking and downlinking in India to check the violation of Program and Advertisement Codes.

This represents up to 1500 TV channels and 800 radio stations transmitting all over the Indian Territory. India is the 7th largest country in the world, with more than 3 million square Kilometers. The first challenge was to collect and transfer more than 2000 broadcasted feeds into one central location in New Delhi.



The satellite reception equipment and the receivers were supplied by SpaceLink.

The second challenge was to set up a central data-center with the capacity to encode more than 2000 channels, to store all broadcasted content 24 hours a day, 7 days a week, during 6 months, in a central storage accessible to hundreds of operators with an access time below 1 second.



**The Data-Center within the EMMC facilities.
Some empty racks are ready for Phase II.**

The third challenge was to automate the monitoring functionality as much as possible. Rather than having hundreds of operators working on 3 shifts to monitor all content, it was necessary to use automatic content monitoring tools such as automatic detection and indexing of all commercial Ads. Another automation tool was required for the extraction of all spoken words, first in all English spoken channels, followed by Hindi channels, and followed by all 14 regional languages. This challenge requires a powerful speech to text in up to 14 languages, together with indexing of all key-words, and with the ability to search for some specific words, and issuing alerts.

Finally, there was a need to migrate from a previous locally supplied monitoring system, into the Actus monitoring system while maintaining or improving all work procedures, and limiting any interruption to both recordings of channels and to human operations.

Public Tender

The government of India issued an international public tender in 2014, to which all leading monitoring companies responded. This was a project for setting up the largest broadcast monitoring system in the world and it attracted attention of a dozen vendors from India, the United States, Australia, and Europe.

Actus, represented by CMS, scored the highest points on the technical proposal, and especially on its proven ability to provide a very comprehensive system, where all functions are fully integrated into one solution. The user interface of Actus was also judged to be superior to all other systems. And finally, Actus demonstrated better encoding and player capabilities, that are more efficient than all other systems, and therefore the number of recording servers was lower, while the image quality was higher. The better efficiency of the Actus encoders was responsible in part for a more economical proposal, and a better solution overall.

The Actus system was installed in December 2014 and early 2015, by CMS, which is the system integrator who won this tender with the Actus solution. After a couple of months of integration, configuration and training, it went into full production for the first phase of 600 TV channels.

The Solution

Actus came up with a fully integrated solution, fully digital, and based on IP Transport stream.

All feeds, from all sources (TV, Radio) and from all geographic locations, are converted to IP streams using 3rd party encoders.

From there, all streams, and all TV channels and radio stations, are fed into two dozen Actus recording servers who encode them into Mpeg4 and AAC H.264 which present the best quality size ratio.

All channels are stored in dual locations for redundancy purposes. One copy is kept inside the Actus recording servers for a few days, while a second copy is immediately pushed to a central storage with a capacity of many hundreds of TeraBytes.



The full solution includes two large UPS² units to protect the Actus servers from any power outage.

Hundreds of operators, using hundreds of workstations, all have immediate access both the Live contents and to archived Media.

The Actus system comes with an integrated workflow intended for Media regulators. The operators can review Live Media, or Archive Media, flag violations, and write reports and create clips for proofs, all from the same user interface.

The Actus AdWatch module automatically detects all appearances of all marked commercial Ads. This totally replaces the need for human visual monitoring of commercial channels. The detected advertisements are later analyzed and a report is easily created to flag hours during which the amount, or time of commercial Ads, or program promos, exceeds the limits imposed by Law.

Some programs that require complete transcription are automatically converted from Speech to Text through the integrated STT³ module. The transcriptions are integrated back into the Media database so that operators can view them as sub titles inserted into the Video.

In addition, a Keywords search module can flag and alert for the appearance of any suspected word that was created by the STT module. This assists in the flagging of inappropriate language violations.

² UPS = Uninterrupted Power Supply

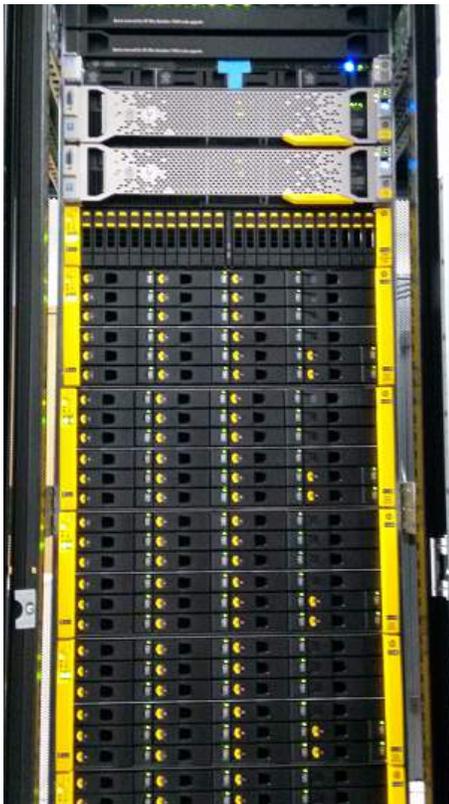
³ STT = Speech to Text

Challenges Encountered

Such a large installation is rarely problem-free, and indeed, there were a couple of major challenges encountered during the installation.

One of the challenges had to do with optimizing the various communications and networks components for the large flow of data that was passing from the various regions, through the hundreds of encoders, and into the central storage. Actus used the expertise of its network engineers and managed to optimize and stabilize all network segments within a couple of weeks.

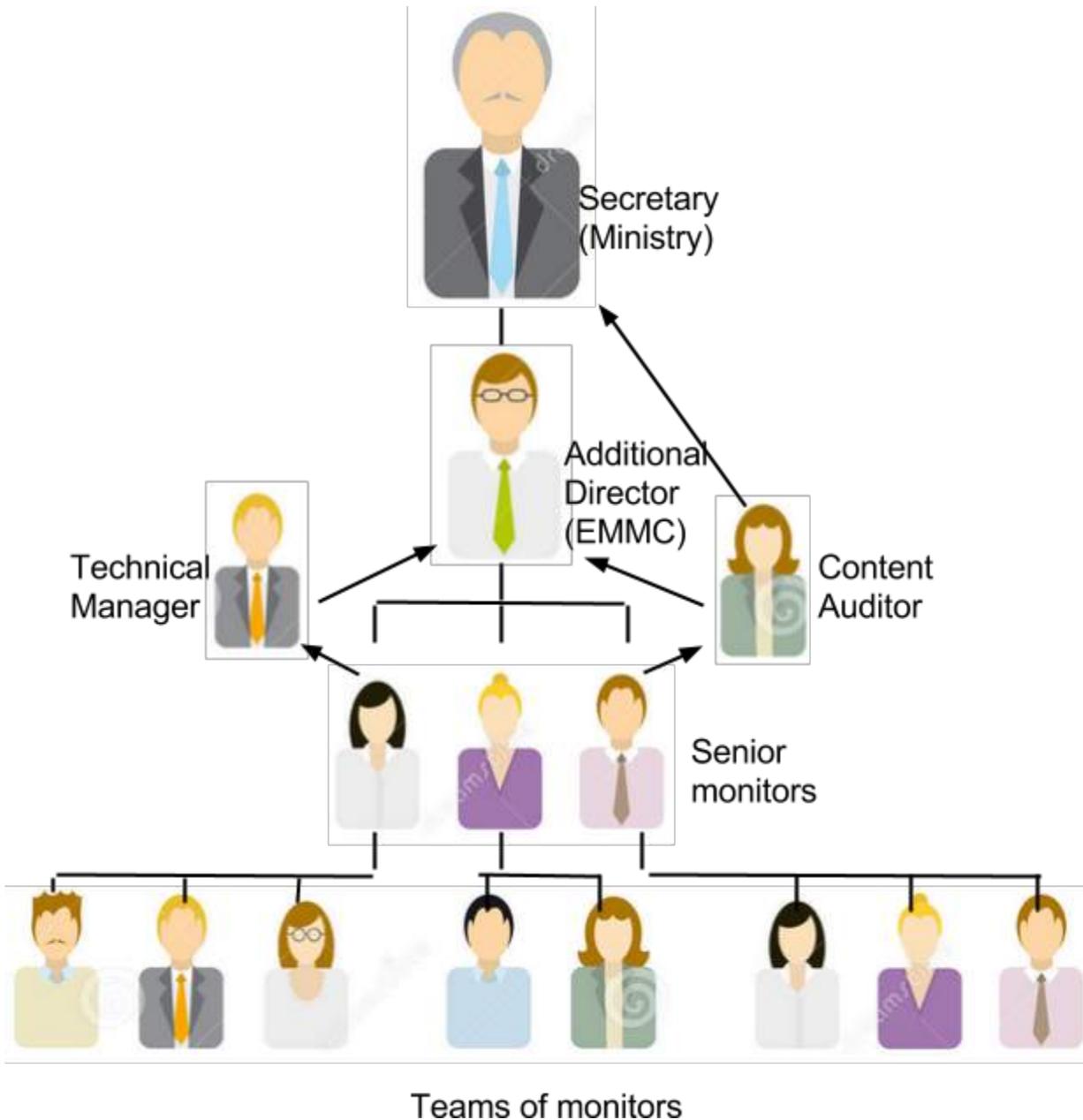
The second challenge had to do with the central storage which was at first, incapable of handling the large amount of files writing per second. Actus R&D department cooperated with the vendor of the central storage and with a mix of optimizations on the storage side, and some developments of special buffers on the Actus side, managed to obtain a write rate which is within, and even beyond, the central storage specifications.



One of the two Central Storage cabinets providing many hundreds of TeraBytes.

EMMC Organization

In order to understand the EMMC workflow presented below, please refer to the following conceptual organisational chart:



The monitors and the monitoring trainees (200 to 300) all report to a number of Senior Monitors. (10 to 12).

The Senior Monitors report to the EMMC Technical Head of Monitoring on all technical issues.

And, they report to the EMMC Additional Director on all operational matters.

They send all reports to the Content Auditor, who is in charge of further distribution to the government.

The EMMC Technical Manager also reports to the EMMC Additional Director, who, in turn, reports to the Secretary of the Ministry of Information.

EMMC Workflow

The monitoring department is divided into sectors. For example one sector handles News while another sector handles GEC⁴.

Each violation results therefore in one clip (“proof”) and of one report. These are stored in the files system and indexed by sector⁵, by channel, and by period.

EMMC is working in bi-weekly periods. Each period is either from the 1st to the 15th of the month, or from the 16th to the end of the month.

All files are stored on the Central Storage and accessible only to authorized personnel.

Violations

The GEC teams are assigned each a number of channels. They work mostly on archived content from the previous few hours or from the previous evening. Their objective is to flag a number of violations such as :

- Bad language
- Forbidden visual content
- Forbidden advertising (for this specific time period, or in general)
- Advertising inserted (L shaped) where not allowed
- And more.

Each violation has a specific code. The monitor is recording the code, together with a marking of the video segment (channel, time-in, time-out). The monitor then adds a textual description of the violation and of the context.

Each monitor compiles a daily report of flagged violations. The reports of each team are combined into a daily team report, which is sent to the Senior Monitor in charge of the team.

⁴ GEC = General Entertainment Channels

⁵ For example News, or GEC

The report includes, for each violation, the channel, date, time, violation code and textual description of the context in which it occurred.

The senior monitors have a console from which they can monitor which teams prepared which reports, and what is the current status of each report (for example: added, checked, approved, rejected, consolidated, ...)

The same console also provides visibility on the users, login times,

And, for each violation, it provides the monitor name, event date time, report date, time, violation code, reviewed by, on.

It is possible, from the console to download (Word file and clip), Edit, Accept or Reject.

News Coverage

The News sector is divided into a number of teams. Each team is assigned a number of News channels to monitor. There are 14 regional languages in India, each team is assigned channels in one regional language. The News monitoring teams are watching Live News, as well as in-depth analysis of stories from the archive. The Actus system allows seamless access to both Live and Archive. A special development requested by EMMC was the ability to "pin" a number of Live channels on the side of the screen allowing the monitor to keep on eye on "What's going on Live" while at the same time working on preparing a clip or an analysis of one News story.

Since different teams, working on different channels and different languages, are likely to work on the same topic, for example "Coverage of Prime Minister's visit to India", there is a need to consolidate all reports into one single report per topic. The Senior Monitors will use a software tool to sum up the durations of coverage of the topic by each of the channels into one statistical report presentation.

The senior monitors have an EMMC console from which they can monitor which teams prepared which reports, and what is the current status of each report (for example: added, checked, approved, rejected, consolidated, ...)

The same console also provides visibility on the users and their login times,

And, for each news topic, it provides the monitor name, event date time, report date, time, reviewed by, on,

It is possible, from the console to download (Word file and clip), Edit, Accept or Reject.

The senior monitors check the validity of the report and either approves or rejects it. Valid reports are then sent to the Content Auditor.

EMMC will prepare a “comparative analysis” showing which news channels dealt with which topics, to what extent, and at what duration per day. This report is bi-weekly.

The Content Auditor sends a consolidated daily report of News topics (content) to the government.

The Results

Establishment of a facility capable of Logging and Monitoring of 1500 TV Channels (600 in Phase I) and 800 FM Radio Stations (400 in Phase I) simultaneously on 24 X 7 basis, The conceptual planning for proposed solution was to install a Dish Farm at the terrace of Soochna Bhawan for down linking of TV channels and the IP Transport stream to be fed to loggers. 90% of the TV input channels are SD and 10% are HD. The system records and stores data in central storage. Besides the 30 or so recording servers, there are GUI Web-servers for defining access of content to Monitors, Database servers for storing metadata (flagged data etc.), Content detection servers for automatically detecting commercial Ads, and Speech to Text servers for creating Text Metadata out of spoken speech.



One of the Cabinets hosting Actus recorders. Every recorder encodes 20 to 30 SD and HD channels and stores proxy files before pushing them to the central storage.

The Monitoring system continuously captures, encodes, analyzes and stores live video and audio streams automatically. Users can extract video segments or still photos as MPEG and JPEG files for sharing and presentation. The Monitoring is able to automatically detect repetitive video-audio clips such as ads, promos, election campaign ads etc. Monitoring is done on 365 X 24 X 7 basis. The system caters for a staff of 250 Workstations in Phase I that will increase to 350 Workstations in Phase II.



The project includes 300 workstations, spread over five monitoring rooms.

At present, with the implementation of Phase I, EMMC records and monitors around 600 TV channels round the clock. EMMC monitors and carries out a scrutiny of violations by electronic media in accordance with Codes framed under the Cable Television Networks Regulation Act, 1995. EMMC puts out reports on violations along with the recorded clips to the Scrutiny Committee, which examines and goes into the purported violations and forwards its findings to the Inter-Ministerial Committee and other bodies for further action.

In a separate workflow, EMMC also monitors all national News channels and compiles a report of all News topics, and coverage by channel. This report is composed of a multiMedia document, with Video, audio, written analysis, and statistics.

The Video Monitoring department is now better focused on the tracking and handling of non-regulated content in response to viewers' and the regulator's complaints, and able to provide their reports faster and more accurately utilizing a complete digital solution provided by Actus.

"...The major improvement, besides getting rid of the previous Analog based monitoring system, is that Actus modules improved our workflow and we also got the ability to react fast and automate our work."