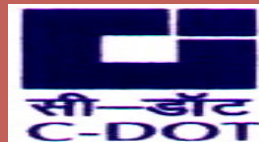


# PRACTICAL SUMMER TRAINING

UNDERTAKEN AT



CENTRE FOR DEVELOPMENT OF TELEMATICS

CENTRE FOR  
C-DOT CAMPUS, NEW DELHI

SEMINAR

ON

STUDY OF DIGITAL SWITCHING SYSTEM

MAIN AUTOMATIC EXCHANGE

# Points to be explained

- ❖ About C-DOT
- ❖ C-DOT DSS Family
- ❖ Basic services provided by C-DOT DSS MAX
- ❖ Hardware Architecture
  - ❖ Base Module
  - ❖ Central Module
- ❖ Power Plant of C-DOT DSS MAX
- ❖ Signaling
- ❖ Alarm Display Panel
- ❖ ISDN

# About C-DOT



## History :

- The Center for Development of Telematics (C-DOT) is the telecom technology development center of the government
- It was established in August 1984 as an autonomous body

## Objectives :

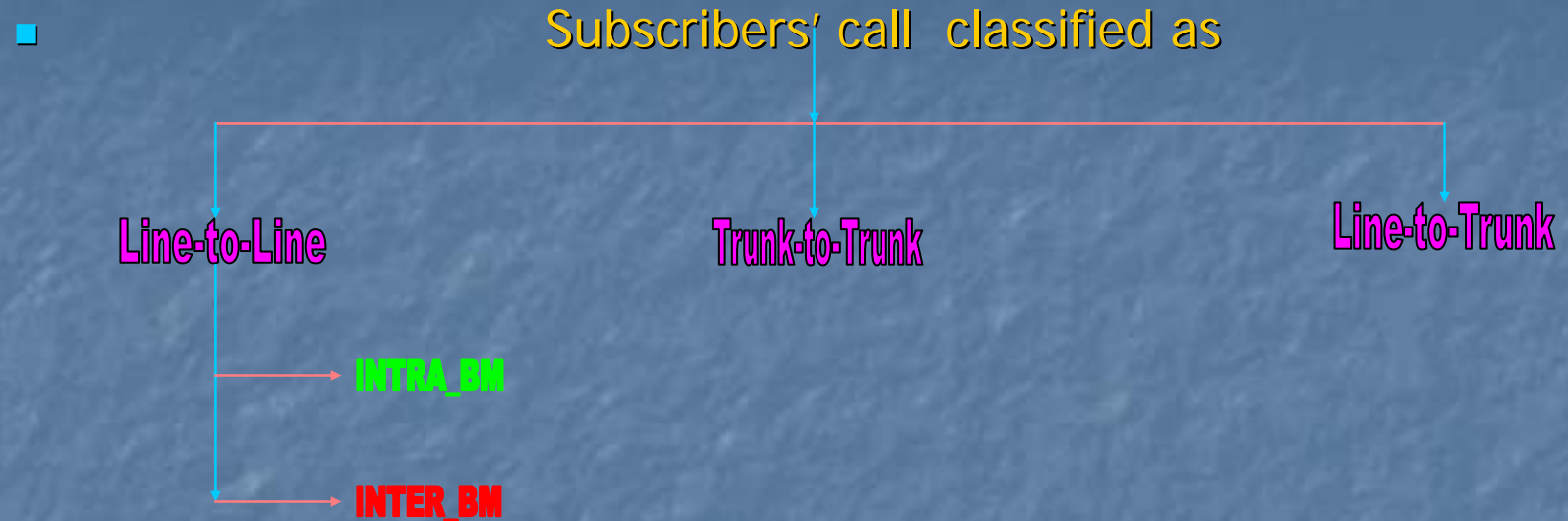
- Work on telecom technology products and services
- Provide solutions for current and future requirements of telecommunication and converged networks for rural application.
- Provide market orientation to R & D activities and sustain C-DOT as center of excellence

## Achievements :

- C-DOT Technology based system from 200 lines to 40,000 lines capacity in operation
- More than 30,000 C-DOT Exchange totaling approximately 25 million telephone lines installed and operational in field
- Deployed telecom equipment value of Rs.7500 crore

## BASIC SERVICE IN DSS MAX

- The most important function of a DSS switch is to process subscriber calls.



- During a line-to-line call, the origination BM detects when a subscriber's telephone receiver has been picked up.
- The BM provides the dial tone and then removes the dial
- When AM has selected an available path. It alerts the CM to set up link between the BM's.
- The CM provides call paths between BM's and carries all internal system communications.

# The C-DOT DSS FAMILY

- C-DOT DSS MAX is a universal digital switch
- Application as local, transit or integrated local and transit switch.
- High traffic or capacity of 40000 lines as local exchange or 15000 trunks as Trunk automatic exchange.
- It has the facilities like RSU which provides switching facility locally even in case of failure of the communication path to the parent exchange.
- Electronic Design automation (EDA) Tools for hardware and ASIC Design. Case Tools for Development and testing of software



## POWER PLANT OF C-DOT DSS MAX

There is five modules, each having 200 amp.

AC is input and DC is output.

Input is between 340-475 V and output is -48V.

From the rectifier, which derives 48V DC from 440V AC.

Power cables are terminated on the DC distribution panel (DCDP).

Distribution panel consists of two bus bars for -48V, one each for copy 0 and 1 equipment.

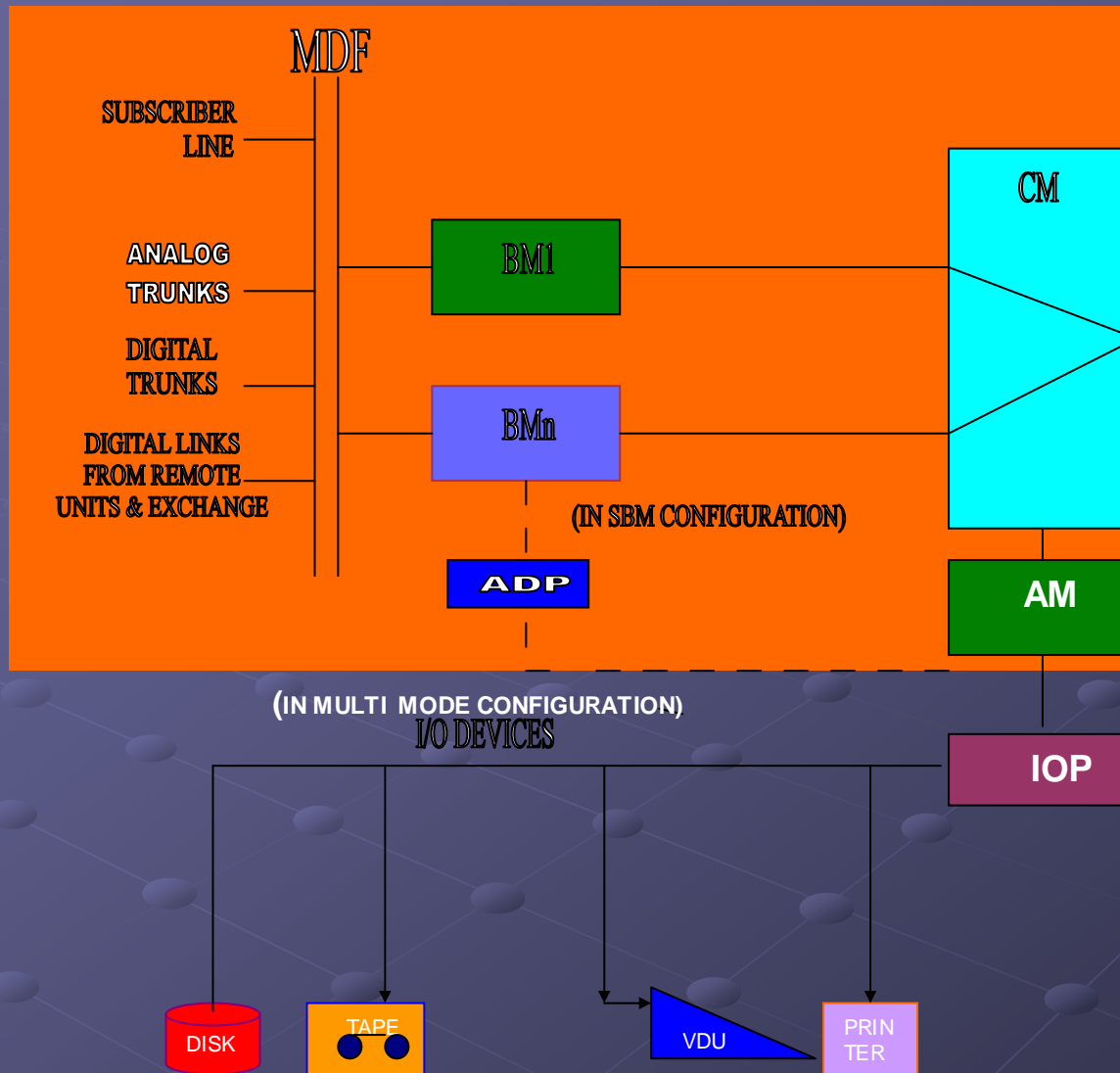
Similarly there are two bus bars for ground.

# HARDWARE ARCHITECTURE

C-DOT MAX

exchange configured



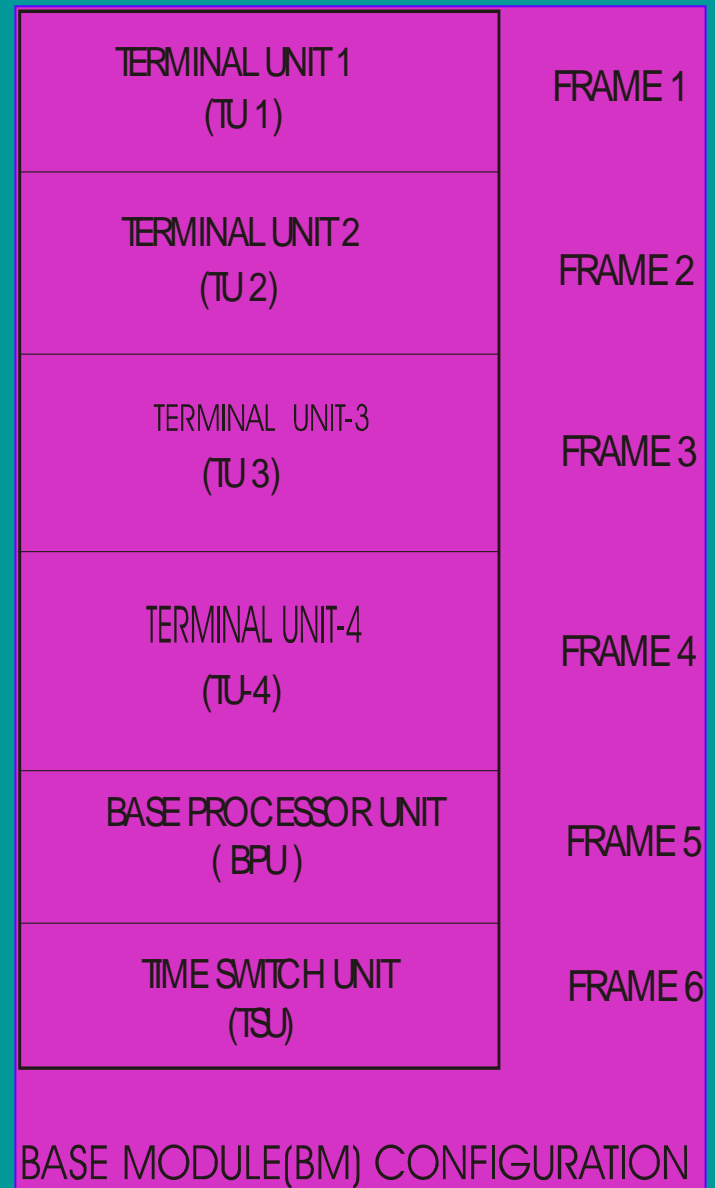


# C-DOT DSS MAX BASIC ARCHITECTURE



## BASE MODULE (BM)

- The interfaces may be subscriber lines, Along and digital trunks.
- Each Base Module can interface up to 2024 terminations.
- The Basic functions of a base modules are:-
  - ◆ Analog to digital conversion of all signals on analog lines and trunks.
  - ◆ Communicate with the AM via the CM for Call processing
- There are two types of Base Modules :-
  - ⊗ Single Base Modules (SBM)
  - ⊗ Multi Base Module (MBM)



*Four Units are :-*

**1. ANALOG TERMINAL UNIT (ATU):-**

- Interface 128 analog termination.
- A unit has 16 line cards so, total subscriber  
 $16 \times 8 = 128$   
In 4 units =  $128 \times 4 = 512$  subscriber

**2. DIGITAL TERMINAL UNIT( DTU ) : -**

- It is used to interface digital trunks, used between the exchanges.
- Each interface occupies one TG of 32 channels and four such interfaces share 4 TGs in a DTU.
- Out of 32 channels, 30 for voice communication and remaining two for Signaling and Synchronization.
- In DTU 4 TGs are there so total number of unit are  $4 \times 30 = 120$  units in DTU.

**3. # 7 or SIGNALING UNIT( SU):-**

- It support call processing function for CCS 7 calls.
- It interfaces Time Switch.

#### **4. REMOTE SWITCH UNIT (RSU):-**

- It is used when the exchange is at a far distance from the CM
- In this Enhanced Switch Cards (ETS) used

#### **5. BASE PROCESSOR UNIT(BPU) :-**

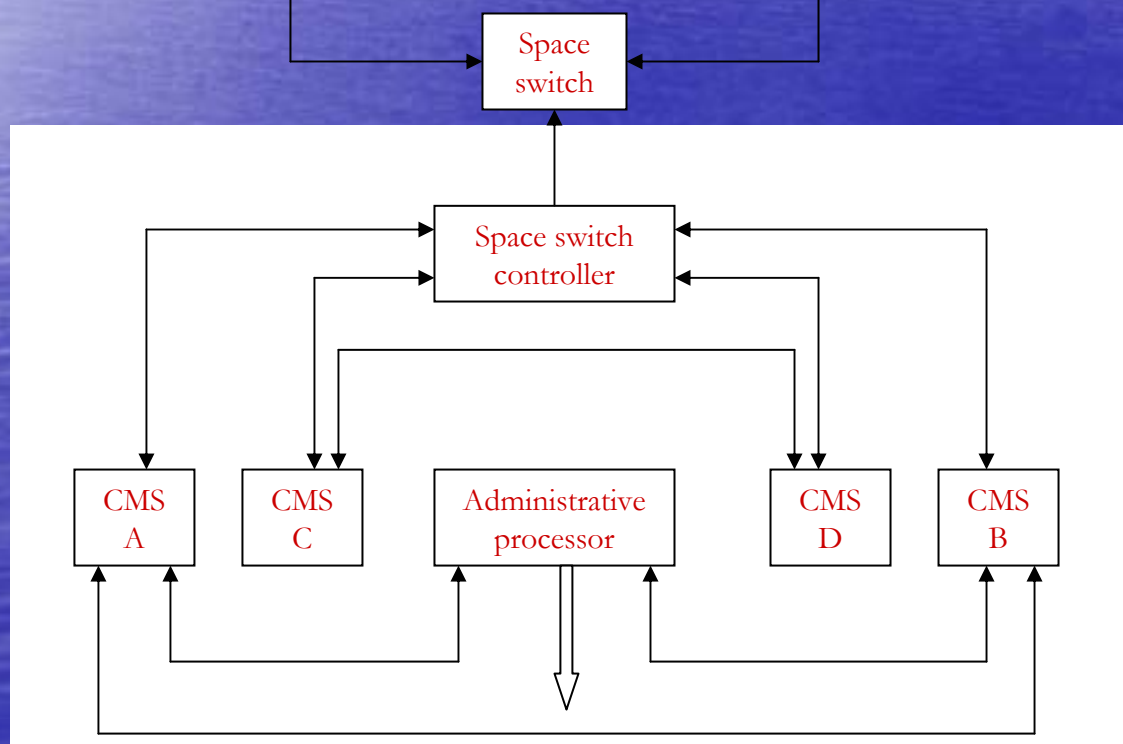
- Base Processor Unit (BPU) is the master controller in the Base Module.

#### **6. TIME SWITCH UNIT (TSU):-**

- Time Switch Unit (TSU) implements three basic function as time switching with in the Base Module, routing of control message within the Base Module and across Base Module and support services like DTMF circuit, answering circuit, tones etc.

## CENTRAL MODULE

- ❖ If the subscriber are more, than use the central module to provide service to 10000 to 40000 subscribers.
- ❖ Central module is responsible for space switching of inter-Base Module calls, communication between Base Module and Administrative Modules, clock distribution and network synchronization.
- ❖ Central module has a Space Switch, Space Switch Controller, a Administrative Processor and a Central Message Switches CMS(A,B,C,D). In a 32 Base Module configuration



Control Scheme  
for Space Switch

There are two types of CM

- 1.CM-XL (Extra Large)
- 2.CM-L(large)

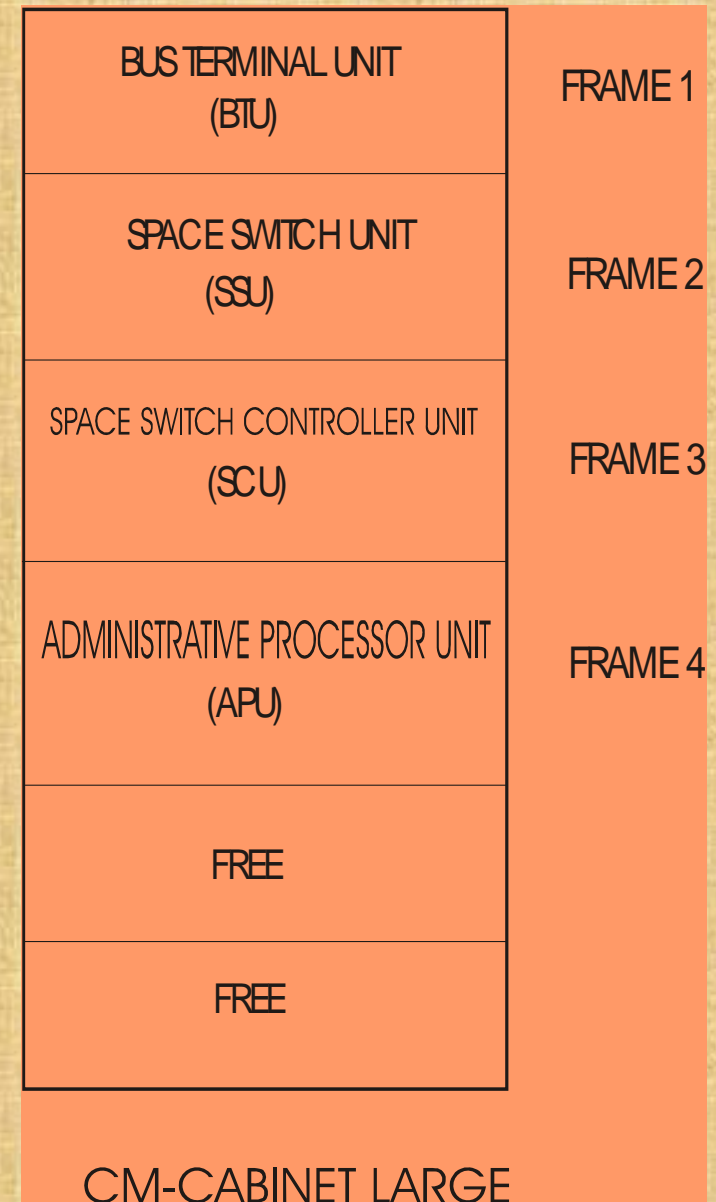
## CM HARDWARE DISTRIBUTION :-

### BUS TERMINATION UNIT :-

- It contains Multiplexer and Demultiplexer.
- It is an Interface Unit Between the BM and Space Switch.
- It controls the Space Switching between Base Modules.
- BTU insert the message CMS to BMS and vice versa.

### Space switch unit :-

- Space Switch provide connectivity between two subscriber of two different BMs on time slot basis.





## Space Switching Controller Unit (SCU) : -

- ❖ It is a CPU complex and interfaces with space switch and clock for controlling the space switch.
- ❖ Interfacing and switching are controlled by SSC which provides control signals for the MUX/DEMUX cards and the space Switch cards.
- ❖ Communication b/w the central message switch and APs, BMs

## Administrative Processor Unit (APU) : -

- ❖ Status of all module of the exchange is maintained by the AP.
- ❖ All the global resource like Trunks ,Time slots etc are managed by the AP.
- ❖ Directory to equipment number translation for the establishment of a call is performed by AP.
- ❖ Administration and maintenance function are supervised by the AP.
- ❖ Connects of exchange to the operator through IOP.



# SIGNALING

- Signaling refers to the exchange of information between call components required to provide and maintain service.
- Signaling system 7 is means by which element of the telephone network exchange information. Information is conveyed in the form of messages.
- SS7 is characterized by high-speed packet data, and out-of-band signaling.

## OUT OF BAND SIGNALING

- Out-of-band signaling is signaling that does not take place over the same path as the conversation.
- Out-of-band signaling information.
- Today, signaling links carry information at a rate of 56 or 64 kilobyte per second (kbps).
- Why Out-of-Band Signaling ?
  - It allow for the transport of more data at higher speeds
  - It allow for signaling at any time in the entire duration of the call, not only at the beginning.

## BASIC OF SIGNALING SYSTEM # 7

- ❖ Common channel Signaling System no.7 (i.e., SS7 or C7) is a global standard for telecommunication defined by the international Telecommunication Union (ITU), Telecommunication Standardization Sector (ITU-T).

### Signaling Links

- ❖ SS7 messages are exchanged between element over 56 or 64 kilobit per second (KBPS) bi-directional channels called signaling links

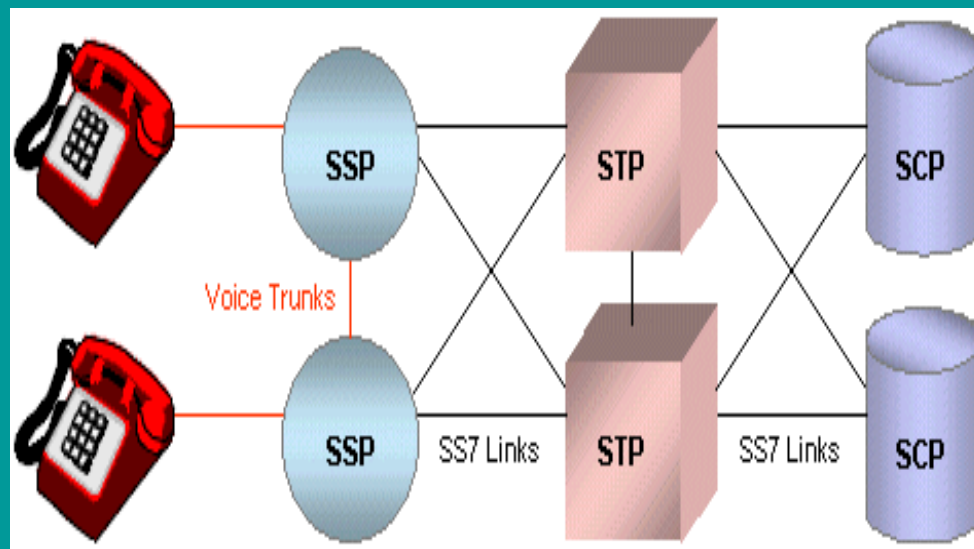
### Signaling Points

- ❖ Signaling path for each message

There are three kinds of signaling points in the SS7 network.

1. SSP (Service Switch Point)
2. STP (Signal Transfer Point)
3. SCP (Service Control Point)

- ❖ SSPs are switches that originate terminate, or tandem calls.
- ❖ An SSP sends signaling message to other SSPs to setup, manage, and release voice circuit required to complete a call.



# INTEGRATED DIGITAL SERVICE NETWORK TERMINAL UNIT (ISDN)

- ❖ One of the four ATUs / DTUs in a Base module be replaced by ISTU to provide Basic Rate Interface (BRI)/Primary Rate Interface in C-DOT DSS.
- ❖ It is directly connected to TSU on 8 Mbps PCM Link.
- ❖ Permits voice, data, text, graphics ,music ,video and other source material to be transmitted over exiting telephone wires.
- ❖ A maximum of 256 bearer channels are provided by integrating one ISTU.

## SERVICE

There are two types of services associated with ISDN:-

- ❖ 1. BRI
- ❖ 2. PRI

## ALARM DISPLAY PANEL (ADP)

- ❖ Display the status of the system in SBM & MBM configuration.
- ❖ The status is displayed on light emitting diodes (LEDs) and seven segment LED display.
- ❖ Fresh faults are reported on the panel by blinking the LEDs accompanied by an audio alarm

In a C-DOT DSS, there are three categories :-

- ❖ non urgent => green LEDs
- ❖ urgent => orange LEDs
- ❖ critical => red LEDs

## CONCLUSION

I would like to conclude this training as a very great and enriching experience to interact with the interesting field in the name of " DSS MAX".

I also learned about the engineer responsibility and about their hard work. By this training I learned the whole procedure of Digital Switching System and Call Processing. learned about Basic Architecture of C-DOT DSS – MAX and functions of its.

## REFERENCES

1. C-DOT DSS MAX General Description
2. Digital Switching System – Sayed Ali

A photograph of two macaws perched on a stone fountain in a park. The macaw on the left has green, yellow, and blue feathers, while the one on the right is primarily red with blue and yellow accents. They are facing each other. The fountain is made of stone and has a tiered design. In the background, there is a building with a tiled roof and some trees. The sky is overcast.

**THANKS**