# *I. T. SET UP OF BANKS- DATA CENTER*

## BY CA. UDAY KULKARNI

# Disclaimers

- These are my personal views and can not be construed to be views of ICAI or of U V K & Associates Chartered Accountants.

- These views do not and shall not be considered as professional advise.

- The views are CBS application & architecture independent.

# CBS

- Central Servers & Central Data Processing.

- Number of Delivery Channels.

- Any branch banking. One Bank Concept.

- Improved Reporting (MIS & Other) at bank level.

- Changes in operations/functions or BPR.

# CBS Set up

- Business Strategy

- IT Strategy

- Technology & Technical Architecture.

- IT Organization & Operations

- Set Up of Data Center & Data Center Operations

- Centralized  Banking Application Operations.

- Support systems

- Database Operations

- Network Operations

- IT security Operations

# Data Center

- Server Room

- Server Racks

- Servers & Storage

- Electricity Supply

- Cooling System

- Network Components

- Database

- Channel Switch

- Security Equipments

# Data Center - Standards

- ISO/IEC- 27001, 27002

- PCI-DSS

- SOX

- BICSI 002

- TIA 942

- ------- & others-

# TIA-942

- Classification of Data Center- tier based

- Tiers based upon-

  - DC availability time

  - Architectural, Security, Electrical details

  - Redundant Component

- Tier-1- Basic, huge downtime, single power and cooling path, no redundancy.

- Tier-2-N+1 Redundancy, huge downtime, single power and cooling path

- Tier-3- Less downtime, N+1 Redundancy, Multiple power and cooling path.

- Tier-4- very little downtime Multiple power and cooling path, N+1, N+N redundancy.
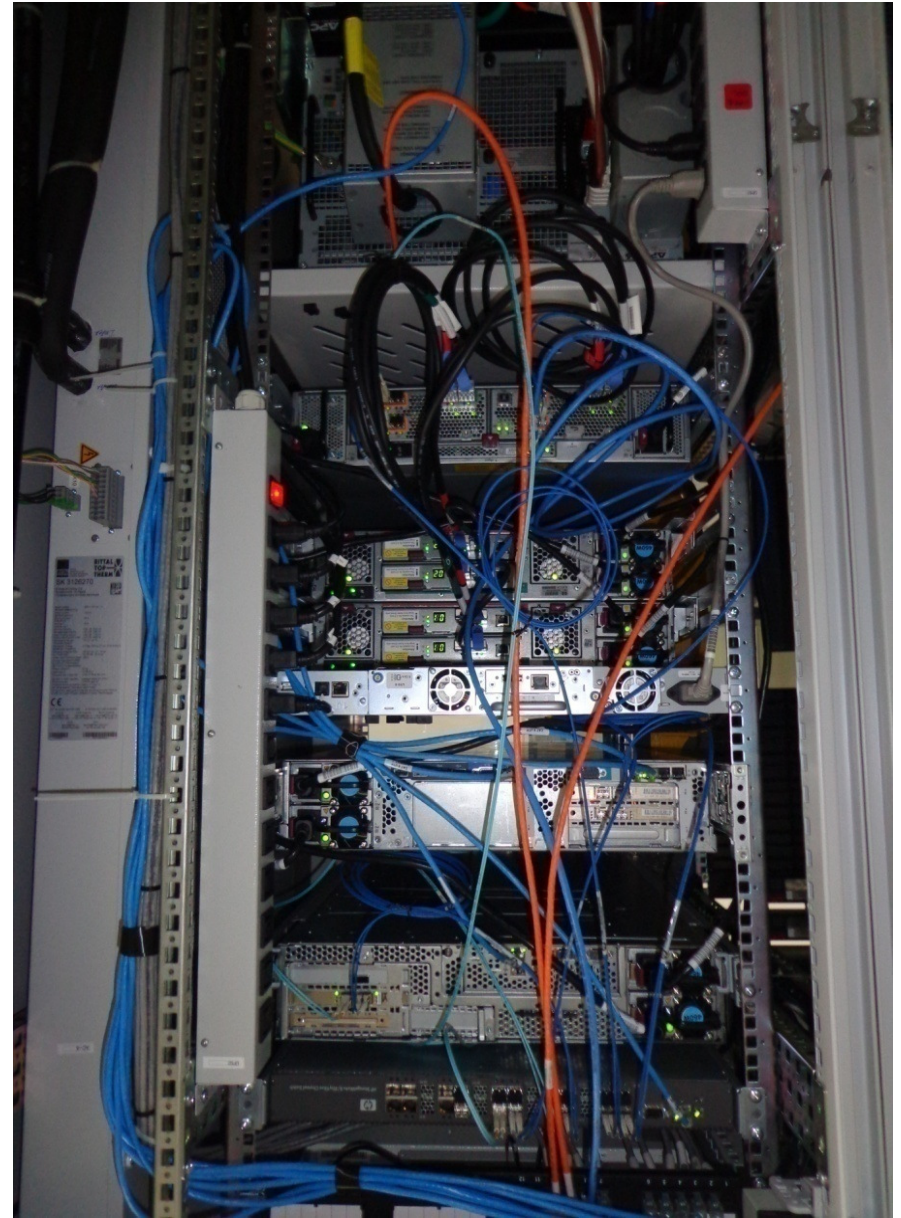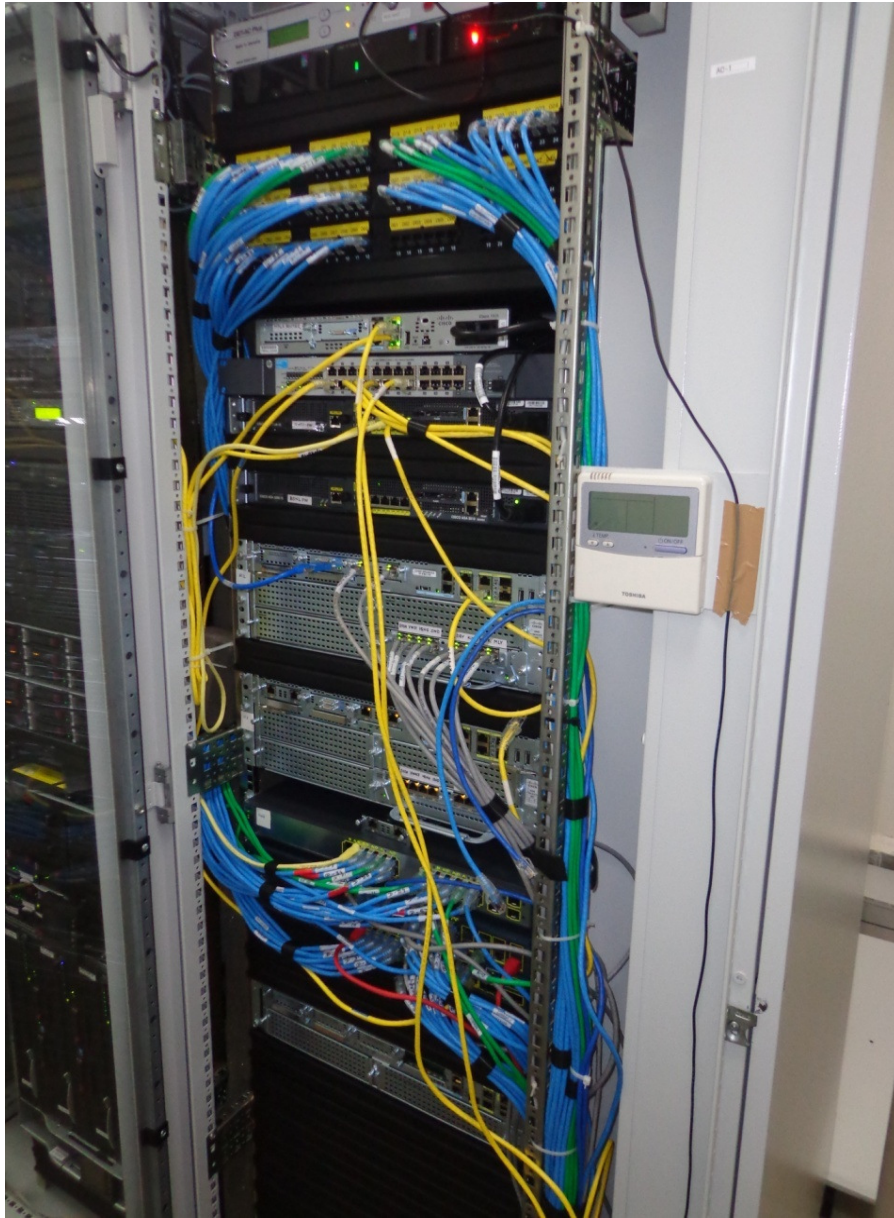
# *Server Room*

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- Types of server Room
  - Integrated
  - Modular
  - Specially Built
- Space- location – natural calamity, emergency services access.
- Heating, Ventilation, Air conditioning, system.
- Security Aspects- Physical Access Control-Biometric Devices

# *Server Racks*

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- Size of Server Racks- i.e. number of U

- Use of Server Rack

- Power Consumption per Rack

- Lock with Card Access- Unique PIN

- Fire & Water Leakage Detection within Rack

- Rack mountable fire detection and suppression system & its sufficiency.

- Rack Video Surveillance system

# Electricity Supply

- Total Consumption of Electricity for Data Center- e.g. servers, cooling system, racks, telecommunication, general lighting etc.

- Independent Line of Electricity Supply-Isolated transformer.

- Electrical Panel – Compliance of country specific electrical codes.

- Generator

- ATS- Auto Transfer Switch with redundancy arrangement.

- Electricity Cabling.

- ASHLAE earthing along with copper earthing.

# *Electricity Supply*

- UPS & its redundancy with SNMP interface for monitoring.

- Rack Mountable arrangements

- Battery Back up time period.

# *Cooling System*

- Inbuilt air conditioner- auto switching.

- Uninterrupted power supply for cooling system.

- Refrigerant Gas- R-410A

- Temperature Monitoring

- Outside Temperature Monitoring.

# *Servers*

- Technical Architecture

- Server Sizing

- Rack Server or Blade Servers

- Database Servers

- Application Servers

- MIS Servers

- Channel Servers

- Load Balancing

- Use of Virtualization

# *Servers*

- Antivirus Software and licenses
- Up-dation of antivirus
- Configuration of OS- use of security features
- Domain  Creation and logical access controls
- Server Downtime- reasons
- Server overheating during power failure.
- Server Performance- Use of CPU, Processing speed.
- Maintenance Plan
- Back up servers

# *Servers- Storage*

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- Storage – Production & Back up

- RAID- Redundant Array of Independent Disks.

- RAID  level configuration-
  - Striping – writing in all disks by file distribution
  - Mirroring- disks maintains identical data simultaneously.
  - Disk Stripping & Mirroring- Redundancy with high performance.

- Server Storage Configuration-
  - Direct Attached Storage-*DAS*
  - Network Attached Storage- *NAS*
  - Storage Area Network-*SAN- Mostly used- high processing power with high performance*

# Servers- Storage

- Storage Management Architecture

- Software version, its licenses

- Patch up-dation procedure

- Verification of Storage configuration.

- Access controls

- Performance Monitoring.

- Encryption of data at rest.

# *Virtualization*

- Virtualization architecture.

- Interface with Other environment.

- Hypervisor software, license, latest version & up-dation with patches.

- Redundancy of Hypervisor with license.

- Configuration details for features enabled/disabled.

- Access controls- Change of root default password.

- Performance (IOPS) – data size, network & communication protocol, CPU processing etc.- use of Vmware Capacity Planner.

- Security Monitoring with IPS (Intrusion Prevention System)

- Defining the security zone in firewalls.

# *Database*

- Database Application- Oracle/SQL

- Oracle Database edition-standard/Personal/Enterprise- check available features.

- SQL database Editions- Enterprise/Standard/Business Intelligence.

- License types- no of user/instances/cores covered under each license.

- Installation and utilization of licenses.

- Payment terms for annual services- Patch availability.

- Patch updation process and its performance.

# *Database*

- Objects-

    – Tables- Data value

    – Stored Procedure/ Functions

    – Trigger- Procedural code that is called when a table is modified.

    – Index - Mechanism to provide fast lookup of data.

# *Database*

- DBA & Support team.

- Data size monitoring.

- Logical Access-

  – Database server OS access control

  – Roles & Responsibilities of various DBA & support team users.

  – Status of Default users.

  – Password policy for Default users.

  – Connectivity to other servers & users.

  – Number of instances mapped for each users.

# *Database*

- Enable Password Management Capacities.

- Verification of Password Profile for each user.

- Database Privileges Statements- Grant / Revoke available to appropriate authority.

- Database permissions group wise or user wise.

- Encryption – data at rest stage.

- Database Monitoring tools- built in or third party.

- Configuration of listener- listener.ora file.

- Password protection for listener.

# *Database*

- Configuration-
    - OEM- oracle enterprise Manager settings
    - Auto Maintenance Task settings
    - Block size
    - Processors
    - No of Data files, redo logs etc
    - Connection mode
    - Advanced Security Options
    - Archive log enable/disable & its back up
    - Net Configuration file settings
    - Table space alerts.
    - Number of tables
    - RMAN back up and its destination
    - SYS audit status – enable/disable
    - Alert logs in AWR
    - Procedure/ functions setting if any

# Network
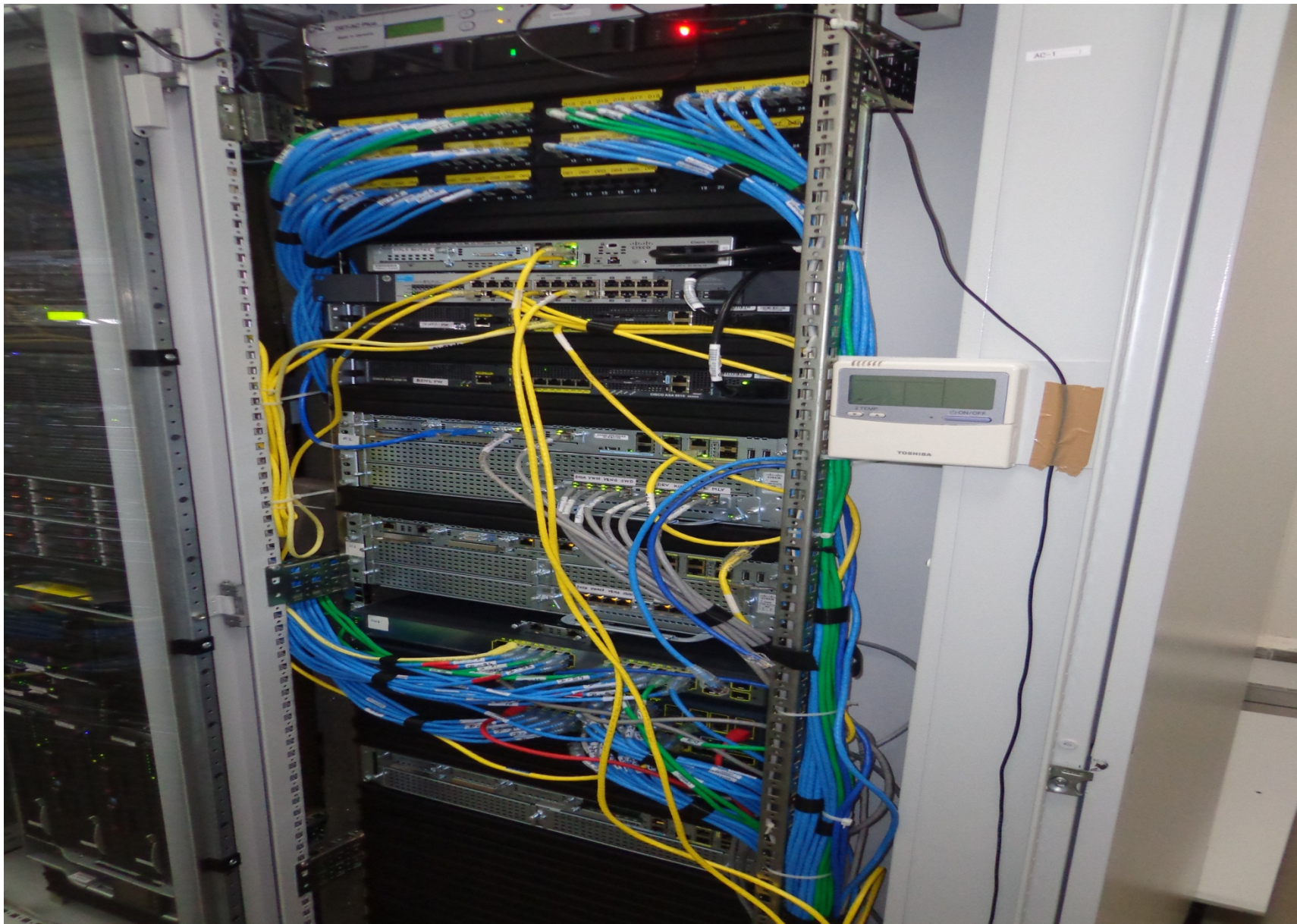
# Network

- Network Architecture details – connectivity to branches- POS-ATM etc.

- Routers & Firewall Configuration.

- Redundancy of Routers.

- Logging of AAA & System events configuration

- Configuration of NTP -  Network Time Protocol.

- Configuration of Banner- router private property.

- Spanning Tree Protocol attack mitigation enabled.

- Configuration to save core dumps.

- Network Monitoring tools- licenses.

- SSH enable/disable-  protection for a network from attacks such as IP spoofing, IP source routing, and DNS spoofing.

# Network

- Firewall Configuration-

    – All packets except defined headed and address are to be denied by default.

    – Firewall rules setting

    – Outside Security levels

    – Inside Security levels

    – DMZ Security levels

    – Coverage in firewall for internet.

    – IP address management

    – Encryption of Data in Motion

# *Interfaces*

- Core Database with other Database e.g. SFMS database

- Connectivity to Switch

- Configuration for RTGS/NEFT/ Foreign Transactions.

- Use of Message Queue internal/external –e.g. IBM MQ

# Thank You

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