



GUJARAT STATE FERTILIZERS & CHEMICALS LIMITED

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Vocational Training Report

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Department : MSD Department

Worked On :

- *Web Application & Web Page Design Using ASP.NET with C#*
- *SAP Basics and Its Various Modules*
- *Networking Basics*
- *Exchange Server*

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GSFC : At a Glance

About GFSC

GSFC was incorporated in 1962 and its plants went into production of fertilizers in 1967. In its very first decade of existence, GSFC became known for its path breaking achievements. It was the first industrial complex in the country set up on joint sector. It was the first company to set up fertilizer plants within a short span of 2 years of getting requisite approvals and also the first industrial project to secure direct and active equity participation of farmers. It was also the first company to adopt the **Steam Naphtha Reforming** process for manufacture of Ammonia.

GSFC has set up the first **DAP Fertilizer Complex** in India at **Sikka** and **Jamnagar**. Originally conceived and started as a fertilizer company with the objective of providing agricultural boost to the farmers in Gujarat and at the same time making Gujarat self-sufficient in fertilizers.

GSFC have a mission of becoming a world class, multi-product, eco-friendly global company contributing to the nation as well as for the welfare of society at large.

Products

With a market presence of 45 years, GSFC has carved out an irreplaceable image for itself on Indian Marketing scene. GSFC's incessant strive for product diversification and value addition has created a product mix ranging from more than 24 brands of fertilizers to petrochemicals, chemicals, industrial gases, plastics, fibers and other products.

GSFC today stands for superior quality with many of its product being **ISO 9001 Certified**. GSFC believes in providing the highest value for customer's money through economies of scale, continuous product improvement and value addition to the products.

GSFC has Customer Centres both in **Agriculture Field (AD & AS)** and **Industrial Field (ADC)** to disseminate the latest technical knowledge for efficient use of the products. GSFC produces 3 types of products namely :

- **Agro-Products :**
 - Bio-Fertilizers
 - Tissue Culture Banana Plants
 - Seeds Nutrisol (Water Soluble Fertilizers)
 - Phospho-Gypsum etc.
- **Fertilizer Products :**
 - Urea
 - Ammonium Sulphate
 - Di-Ammonium Phosphate
 - Various NPK grades to suit different soil needs

- **Industrial Products :**
 - Caprolactam Nylon 6
 - Melamine
 - Cyclohexanone
 - Mek Oxime
 - Oleum
 - Sulphuric Acid
 - Nitric Acid etc.

GSFC Network

Existing GSFC Network is amongst the top 10 Campus networks in India and It is the largest within fertilizer industry. It has over 1800 nodes in the Network and has over 43 km of fiber network spanning over around 60 Departments. It has more than 200 intelligent switches. It also has 10 Gigabit Backbone over single mode fiber and with Ring Topology.

GSFC network has a 3 tier architecture also known as **CISCO 3 Layer Hierarchy** name :

- **Core Layer :**
 - Top most layer of hierarchy
 - Transports large amount of traffic quickly and reliably.
 - Switches traffic as fast as possible
 - Fault tolerance, speed and latency are important issues in this layer
 - In case of failure, every single user is affected.

- **Distribution Layer :**
 - Enables communication between Core and Access Layer.
 - Performs Routing
 - Decides route and forwards request to core.
 - Implements packet Filtering and Queuing
 - Implements security and network policies
 - Defines broadcast and multicast domains

- **Access Layer :**
 - Also known as Desktop Layer
 - Creates separate collision domains

All the outdoor cabling is done with Multi-Mode fiber and all the indoor cabling is done with **Unshielded Twisted Pair (UTP)** cables.

GSFC covers approximately 1800 nodes in Vadodara and about 800 nodes at various places of India. All the locations are connected with highly secured **MultiProtocol Label Switching**

(MPLS) VPN (Virtual Private Network) technology. It is one of the largest Wide Area Network (WAN) in India.

The Network at GSFC-Vadodara is totally Switch Based Network with fiber optic backbone in Ring Topology followed by Mesh Topology in access layer with high end central switches. The Network is spread across 750 acres of the campus interconnecting various offices, plants, control rooms etc. It has a redundant Gigabit backbone serving 9 distribution locations (with Layer 3 switches), successfully connecting to more than 60 departments (with Layer 2 switches). The redundant backbone locations are interconnected using armoured 6-core single mode OFC and the distribution locations are interconnected using armoured 6-core multimedia OFC. Structured CAT5 and CAT6 UTP wiring for about 1800 nodes has been carried out in various departments/locations.

A total of about 90 Intel Express Switches are deployed across the campus with centralized **Network Management System (NMS)** running with HP Openview Network Node Manager and Intel Device View and Network management Software.

Network Development Procedure

Phase 1 : Campus Network at Vadodara

Phase 2 : Link other plants (Sikka, Polymer and Fiber unit) to Vadodara HeadQuarters

Phase 3 : Setting up of enterprise resource package at factories

Phase 4 : Virtual Private Network (VPN) to all the Regional Offices and warehouses

Phase 5 : Web based application for supplier integration

Phase 6 : B2B for customers and suppliers

Management Service Division Department (MSD Department)

Management Service Division Department (MSD Department) is a key service division of GSFC. It provides all kind of IT facilities to GSFC LAN and WAN users including IT infrastructure, connectivity, application, VC etc.

Functions Of MSD Department

- Development and Maintenance of Business Application
 - SAP Applications
 - Non SAP Applications
- Availability of Infrastructure and Support for Maintenance of Business Applications
 - Maintenance of LAN and WAN
 - Maintenance of SAP and Non SAP Servers
 - Manage IT Services
 - Data Centre Maintenance

Systems Applications & Products (SAP)

Overview Of SAP

SAP stands for **System Applications and Products** in Data Processing. It was founded in 1972 by Wellenreuther, Hopp, Hector, Plattner and Tschira. SAP by definition is also name of an **Enterprise Resource Planning (ERP)** software as well as the name of the company. The SAP system comprises of a number of fully integrated modules, which covers virtually every aspect of the Business Management.

Introduction To SAP

SAP is #1 in the Enterprise Resource Planning (ERP) market. As of 2010, SAP has more than 140,000 installations worldwide, over 25 industry-specific business solutions and more than 75000 customers in 120 countries. Other Competitive products in the market are Oracle, Microsoft Dynamics etc.

SAP ERP is an Enterprise Resource Planning software developed by German Company SAP-SE. SAP ERP incorporates the key business functions of an organization. The latest version i.e SAP ERP 6.0 was made available in 2006. The most recent Enhancement Package (EHP8) for SAP ERP 6.0 was released in 2016.

The business processes including SAP ERP include Operations (Sales & Distribution, Materials Management, Production Planning, Logistics Execution, and Quality Management), Financials (Financial Accounting, Management Accounting, Financial Supply Chain Management) and Human Capital Management (Payroll, e-Recruiting).

SAP and Its Connectivity with GSFC

SAP was implemented in GSFC in 2011. The server used for this is SAP ECC 6.0 Development Server.

It is a centralised system software based on ERP that was developed in Germany. This software is used by Managements Service Division (MSD) Department of GSFC. There are 30 employees of TCS that work on SAP software in GSFC. Few other technologies that are used are :

- CMS
- DEV / TTL
- Silver Touch

Phases Of SAP

There are 2 types of Phases which are provided in SAP. They are as follows :

- **Employee Self Service (ESS) :**
 - The SAP Network Portal, commonly referred to as the Portal, is a way for employees, managers and recruiters to interact with SAP and Non-SAP resources in one place

 - Employees update their personal information and request time off with Employee Self Service (ESS) Application in their portal.

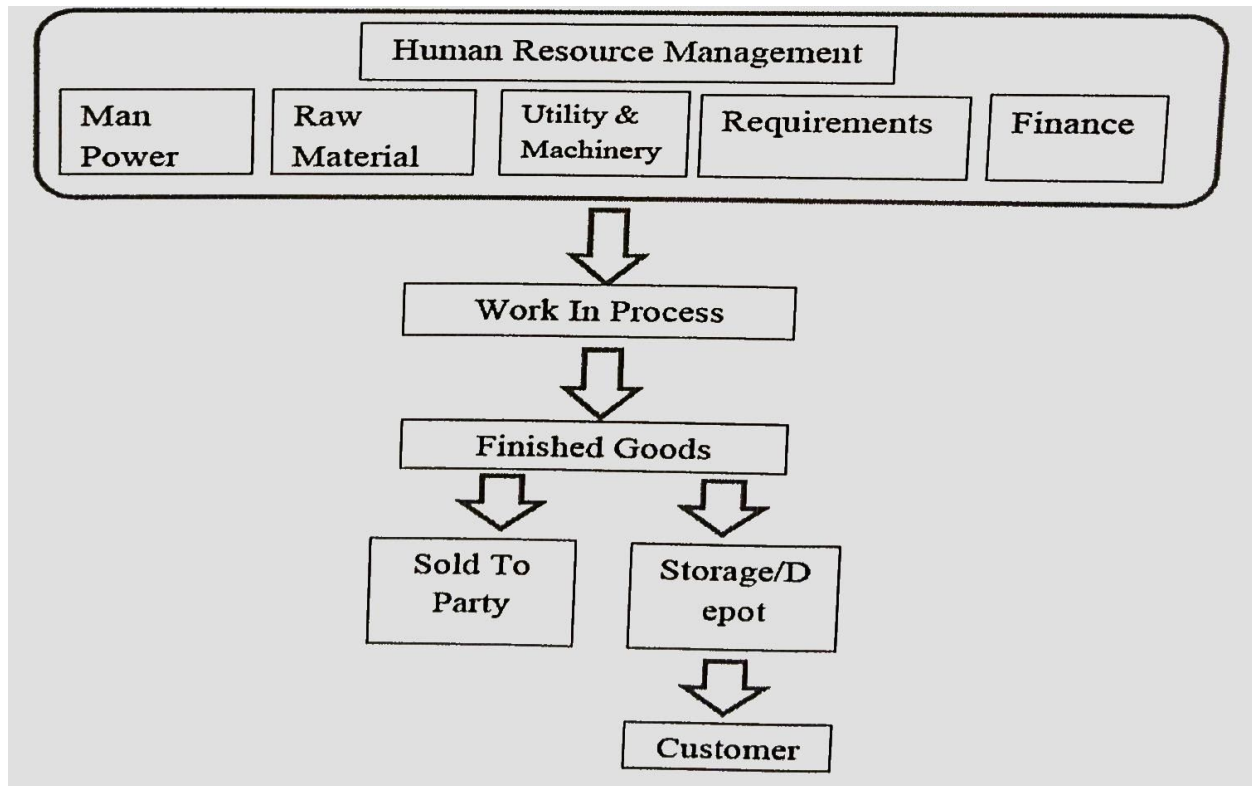
- **ERP Central Component (ECC) :**
 - SAP **ERP Central Component (ECC)** is one of the most recognized assets that SAP owns.

 - It is an enterprise resource planning software which consists of several modules that provide the organization with great control over their key business processes.

Application Of SAP

- Hospital Management System (HMS)
- Integrated Management System (IMS)
- Cash Flow Monitoring System (CFMS)
- Gate Pass Entry System (GPES)
- Distributed Control System (DCS)
- Gas Monitoring System (GMS)
- Safety Module
- Provident Fund (PF)
- Single Sign On (SSO)

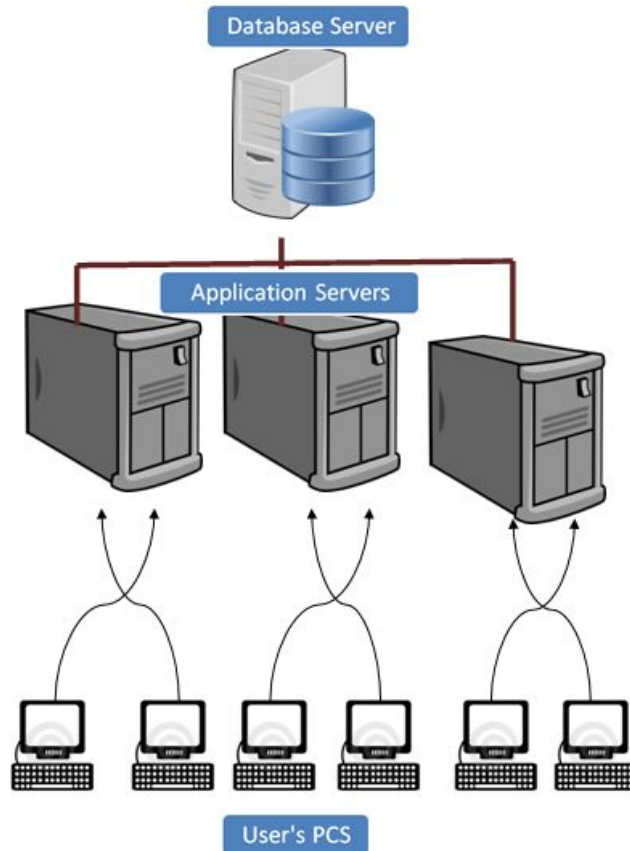
Business Process Of GSFC





SAP Architecture

Introduction To Client Server Technology



SAP R/3 uses 3 tier architecture where R means real time system and 3 means 3 tier architecture.

- **User's PC :**

Users can access SAP in 2 ways :

- Through SAP GUI
- Through Web Browser

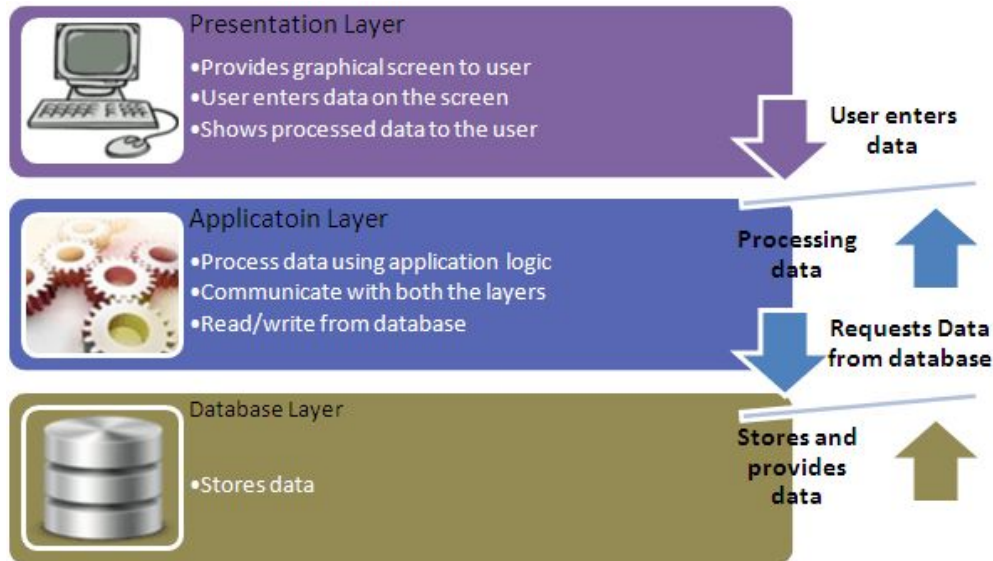
It is called front end. Only the front end is installed in the user's PC not the Application / Database Servers. Front End takes the user's requests to database server and application servers.

- **Application Servers :**

- Application server is built to process business-logic. This workload is distributed among multiple application servers.
- With multiple application servers, user can get the output more quickly.
- Application server exists at a remote location as compared to location of the user PC.

- **Database Server :**
 - Database server stores and retrieves data as per SQL queries generated by **ABAP** and **JAVA Applications**.
 - Database and Application may exist on the same or different physical location.

Various Layers Of SAP



- **Presentation Layer :**
 - This layer contains the software components that make up SAP GUI. This layer is the interface between the R/3 System and its users.
 - The R/3 System uses the SAP GUI to provide an intuitive graphical user interface for entering and displaying data
 - Sends user's input to the application server and receives data for display
- **Application Layer :**
 - Consists of one or more than one application servers and a message server
 - Message server is responsible for communication between application servers.
 - It passes request from one application server to another within the system.
- **Database Layer :**
 - Consists of central database system containing all of the data in R/3 System.
 - SAP has manufactured its own database named HANA but is compatible with all major databases such as Oracle.

- **For Example** : Database contains the control and customizing data that determine how R/3 System runs. It also contains program code for applications.
- Applications consist of program code, screen definitions, menus, function modules and various other components. These are stored in a special section of database called R/3 Repository, and are accordingly called Repository Objects.
- R/3 Repository objects are used in ABAP workbench.

SAP BASIS

The full form of **BASIS** is "**Business Application Software Integrated Solution**". BASIS is set of programs and tools that act as an interface with Database, Operating System, Communication protocols and business application (such as FI, CO, MM etc).

SAP Applications such as FI, CO, PP etc. can run and communicate with each other across different Operating Systems and Databases with the help of BASIS. Now a days BASIS is known as **NetWeaver**.

NetWeaver

NetWeaver is SAP's Integrated Technology Platform and not a product in itself. In fact, new version of basis is called the NetWeaver. It is the underlying technology for all products in the my-SAP Suite. All the products in my-SAP Suite can run on a single instance of **NetWeaver SAP Web Application Server**, also known as "**SAP Web AS**". NetWeaver makes possible access of SAP data using simple http protocol or even mobile. This eliminates the need of installing and more importantly training in SAP's client side software. The core capabilities of SAP NetWeaver are the integration of people, information and process.

Various Modules Of SAP

The Various Modules available in SAP System are :

- **SAP FI Module** : Financial Accounting
- **SAP CO Module** : Controlling
- **SAP PS Module** : Project System
- **SAP HR Module** : Human Resources
- **SAP PM Module** : Plant Maintenance
- **SAP MM Module** : Materials Management
- **SAP QM Module** : Quality Management
- **SAP PP Module** : Production Planning
- **SAP SD Module** : Sales and Distribution
- **SAP BW Module** : Business Warehouse
- **SAP EC Module** : Enterprise Controlling
- **SAP TR Module** : Treasury
- **SAP IM Module** : Investment Management
- **SAP IS Module** : Industries Specific solutions
- **SAP CRM Module** : Customer Relationship Management
- **SAP SCM Module** : Supply Chain Management
- **SAP PLM Module** : Product Lifecycle Management
- **SAP SRM Module** : Supplier Relationship Management
- **SAP CS Module** : Customer Service
- **SAP RE Module** : Real Estate

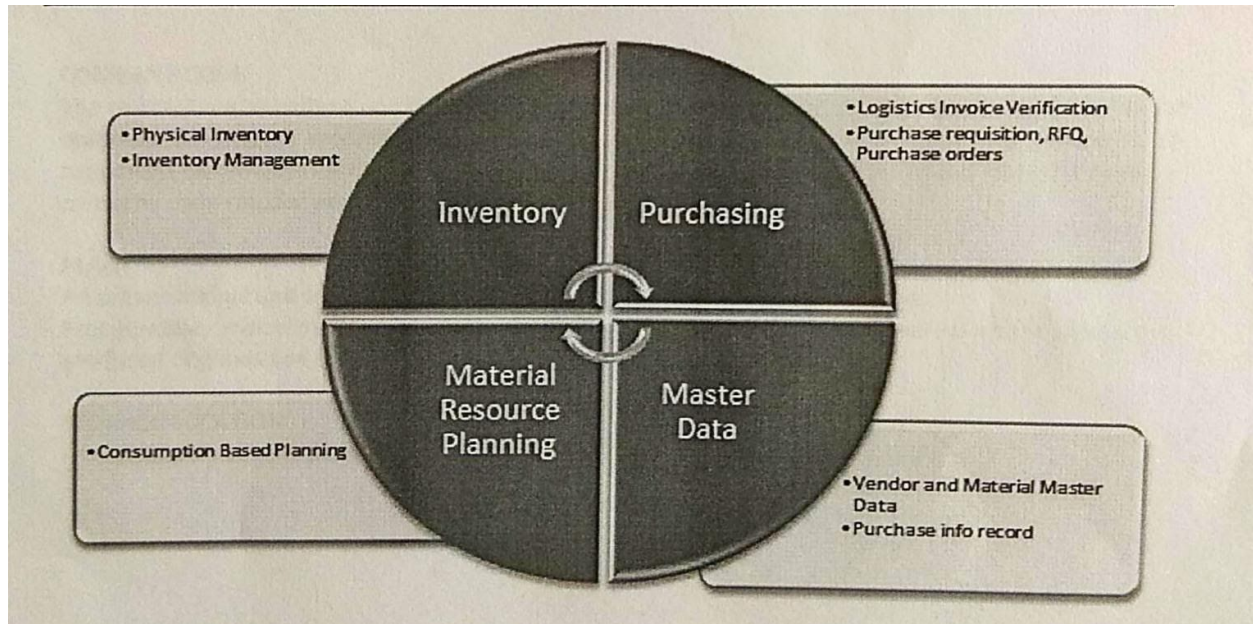
Material Management Module

Material Management Module in SAP consists of several components and subcomponents. The most prominent and widely used are Master Data, Purchasing and Inventory.

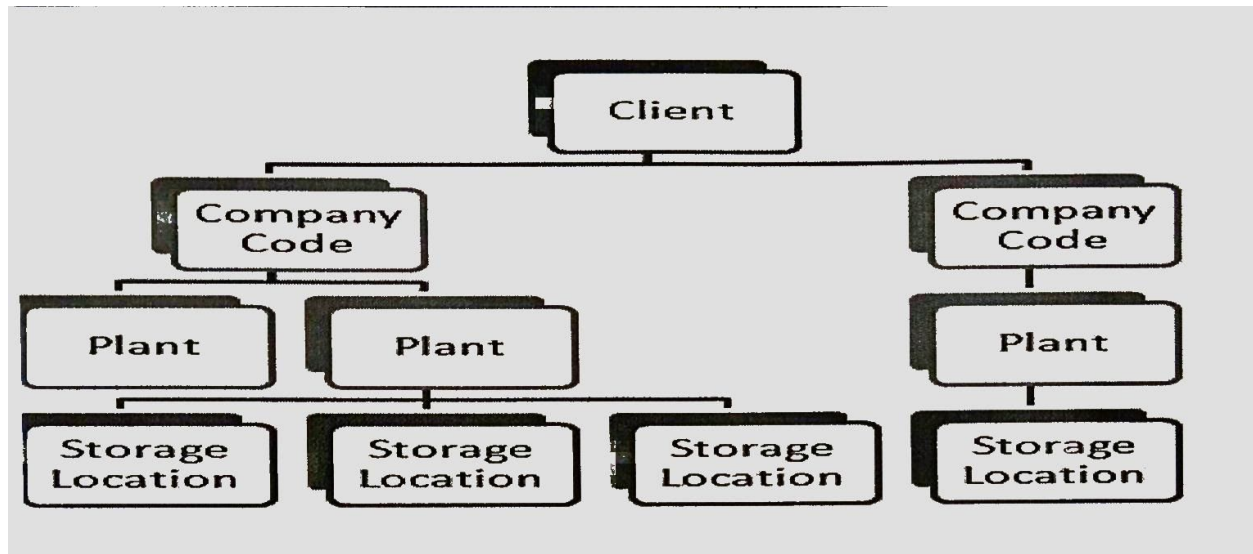
All of these components have their subcomponents that are essential in specific business processes and all of the processes are executed by transactions

Transaction (in SAP) means the processing of certain information in order to complete the requirement for business process. For example, if you have purchased 10 pieces of litter buckets, you can perform particular **Transaction code (T-code)** that will reflect those changes in SAP. Most of the business processes involve multiple SAP Transactions to be accomplished and are spread over one, two or more modules.

Overview Of Material Management Module



MM Module : Organizational Structure



Client :

In commercial, organizational and technical terms, a self-contained unit in an SAP System with separate master records and its own set of tables.

Company Code :

The smallest organizational unit for which a complete self-contained set of accounts can be drawn up for purposes of external reporting. This involves recording all relevant

transactions and generating all supporting documents for financial statements such as balance sheets and profit and loss statements.

Plant :

An organizational unit serving to subdivide an enterprise according to production, procurement, maintenance and materials planning aspects. It is a place where either materials are produced or goods and services are provided.

Storage Location :

An organizational unit allowing the differentiation of material stocks within a plant.

Production Planning Module

Production Planning is the process of aligning demand with manufacturing capacity to create production and procurement schedules for finished products and component materials.

Overview Of Production Planning Module

PP module tracks and makes record of the manufacturing process flows. For example, the planned and actual costs and also goods movements from the conversion of Raw Materials to semi-finished goods. It is fully integrated with the other SAP modules like SD Module, MM Module, QM Module, FI Module, CO Module and PM Module.

PP Module : Organizational Structure

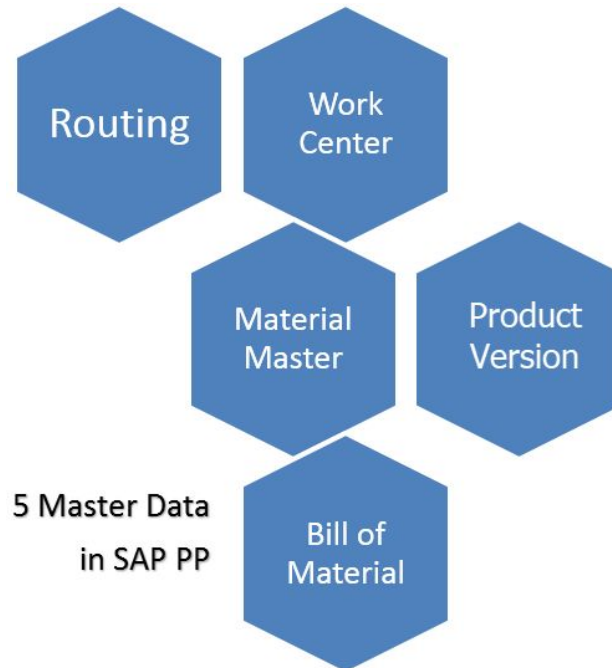
In any live Production Planning Module (PP Module) locations of manufacturing plants and storage within the plants should be available in the system.

Importance of Plant and Storage Locations in Production Planning (PP) :

- All Production Master data is created at Plant Level.
- Planning activities are also performed at Plant Level.
- Production Confirmation process and related goods movement occur at plant and storage location level.

PP Module : Master Data In SAP

Master Data is generally static for any company and is very rarely changed depending on the requirement. There are 5 Master Data to be maintained in Production Planning Module.



Material Master :

The material master contains information on all the materials that a company procures, produces, stores, and sells. It is a number uniquely identifies a material master record, and hence a material.

Materials with the same basic attributes are grouped together and assigned to a material type such as finished, raw material, etc.

It is used for the following purposes:

- To purchase materials
- For Goods Movement postings such as goods issue or receipt in inventory management and also for physical inventory postings
- In invoice verification for posting invoices
- In sales and distribution for sales order fulfillment process
- In production planning and control for material requirements planning, scheduling, and production confirmation processes.

Bill Of Material (BOM) :

A bill of material is a complete, formally structured list of the components together with the quantity required to produce the product or assembly. BOM's are used in material requirement planning and product costing. You can also create up to 99 alternative BOMs for a single product. For Products having variants, you can create Super BOM, which has all

possible types of components used to manufacture different types of variants, and the appropriate component is selected based on characteristic chosen in the sales Order.

For example, Product Cycle can contain all types of frames (with different colors and sizes) and desired frame is selected in production order based on color and size chosen in the sales order.

Work Center :

A Work Center is a machine or group of machines where production operations are performed. Work Centers are used in task list operations (Routing)

It contains data for :

- Scheduling
- Capacity
- Costing

Routing :

Routing is nothing but a sequence of operation performed at the Work Center. It also specifies the machine time, labor time etc. for the execution of operations

It is also used for scheduling of operations and used in standard cost calculation of the product.

Production Version :

The production version is a combination of BOM and Routing data for production. It is a linkage between BOM and Routing and determines the manufacturing process.

There can be multiple production versions as per different manufacturing process to produce the product.

PP Module Cycle

The Production Planning and Control consist of 2 obvious processes of Planning and Execution.

Planning :

Production planning is generally done from budgeted sales plan. Planning is based on the Sales plan to meet the sales requirements as per the production cycle times. Demand for the Product is entered through demand management in the form of **Planned Independent Requirement (PIR)**. This data from demand management becomes the input to **Material Requirement Planning (MRP)**. MRP checks for the availability of various raw materials used for production at different stages using the master data such as Bill of material (BOM) and available current plant stocks.

In case of material shortage, Purchase requisitions are created for materials which are externally procured, and planned orders are created for in-house produced materials.

These purchase requisitions and planned orders initiate the **Procurement Cycle** and the **Execution Cycle of Production** respectively.

As MRP works with infinite capacities, capacity leveling must be done in order to avoid any capacity bottlenecks.

Execution :

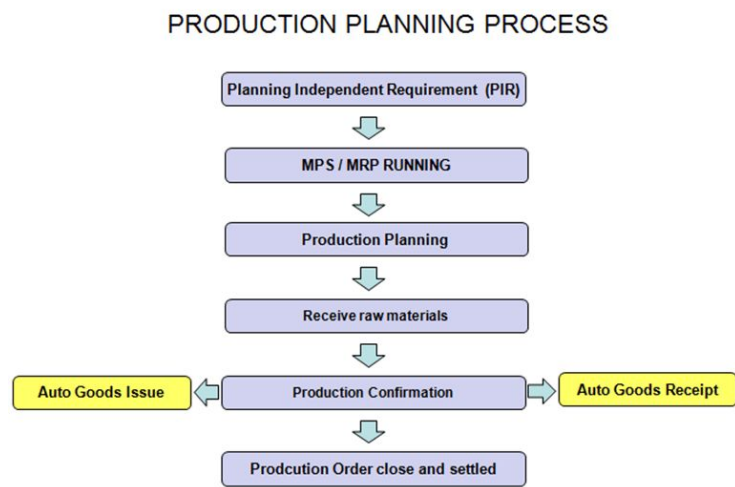
These Planned orders are converted to Production orders, and are scheduled as per the production timings using master data such as routings.

Production Orders are released by the Production Supervisor on the shop floor, and material availability checks can also be carried out to check if there are any missing components.

Production is carried out based on the activities maintained in the Routing where the master data like Work Center is mentioned against each operation in the Routing.

Once the production is completed, the confirmation of orders are executed, and goods movement for material consumptions & goods receipt are posted against the Order. Hence, the Order gets **Delivered (DLV)** status, and the material is received into desired storage location.

Usually at the month end before doing order settlement, production order needs to be set to technically completed status in order to calculate production variances by the controlling personnel.



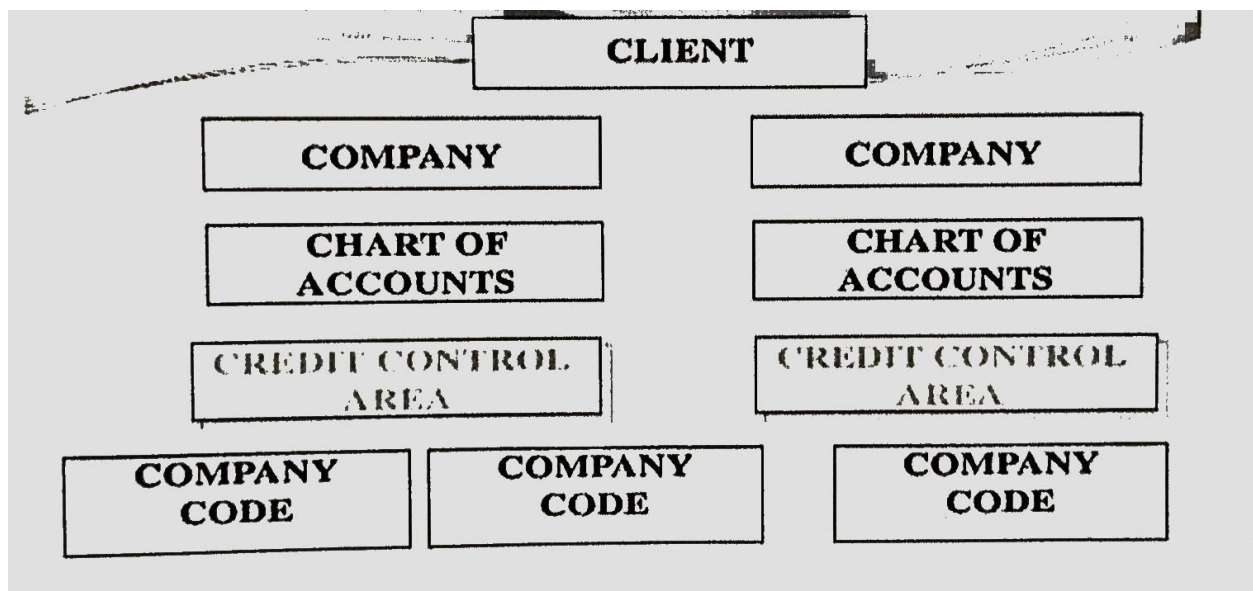
Finance & Costing Module

SAP FICO is divided into 2 sub-modules :

- Finance Accountings
- Costing

SAP FI handles the company financials while CO provides Cost Accounting. Both FI and CO Modules store the financial transaction data.

FICO Module : Organizational Structure



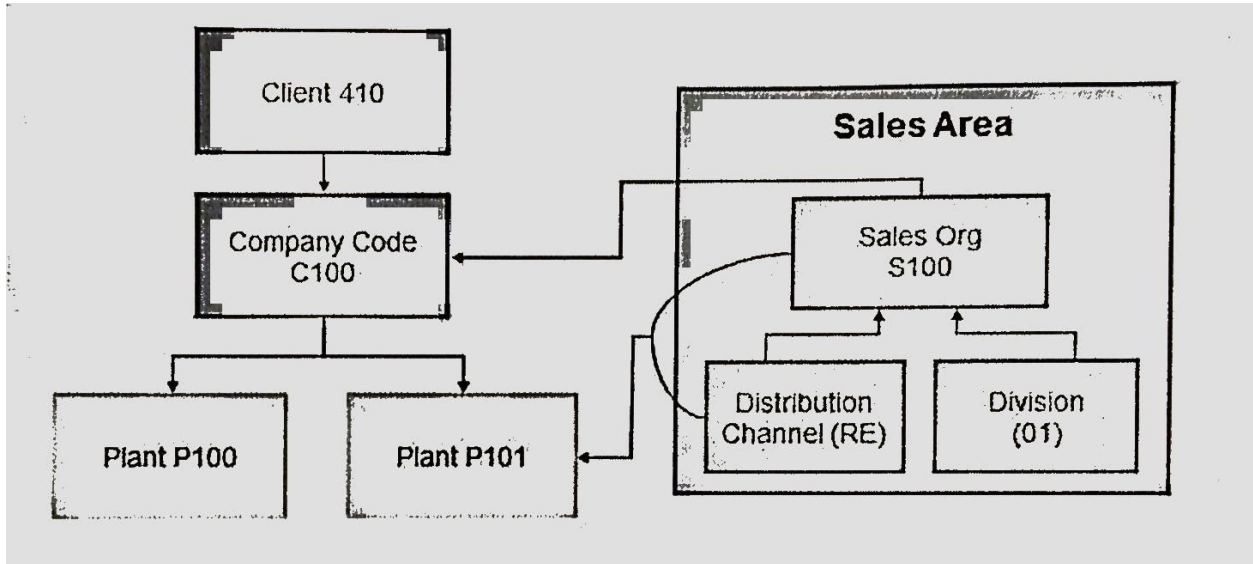
Sales & Distribution Module

These modules include Finance Accounting, Controlling, Production Planning, Materials Management, Business Intelligence, Human Resources etc. SAP Sales & Distribution (SD) is one of the worth noting modules of SAP ERP. In an organization, it deals with shipping, selling and transportation of goods and services.

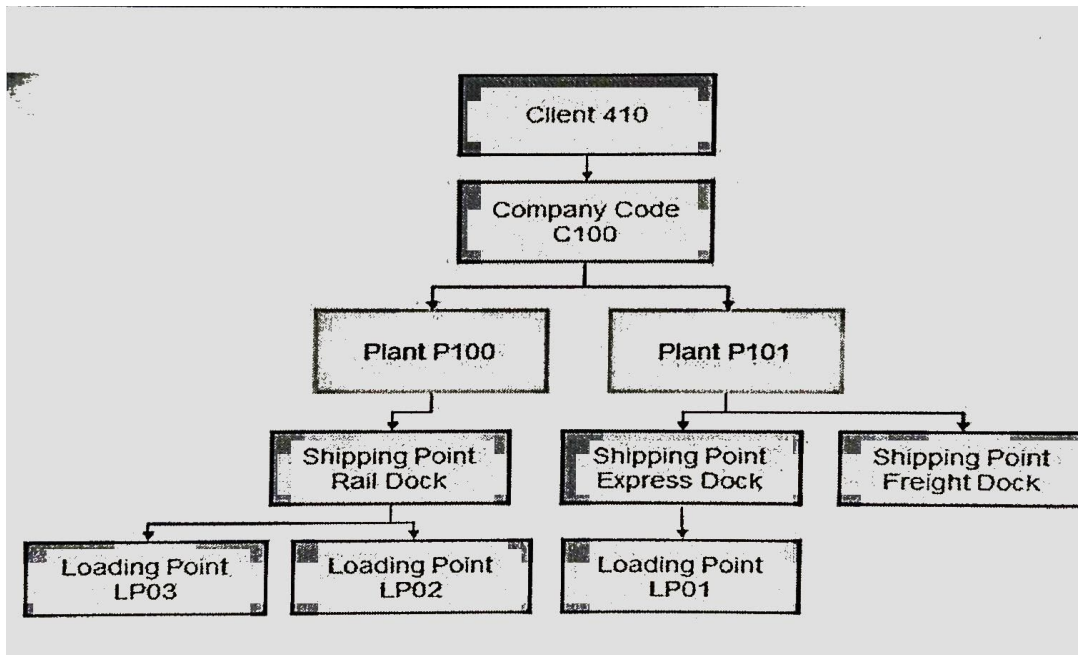
Functionality Of SD Module

- Sales and Support
- Sales
- Shipping and Transportation
- Billing
- Credit Management
- Foreign Trade

Organizational Structure : Sales Processing



Organizational Structure : Distribution



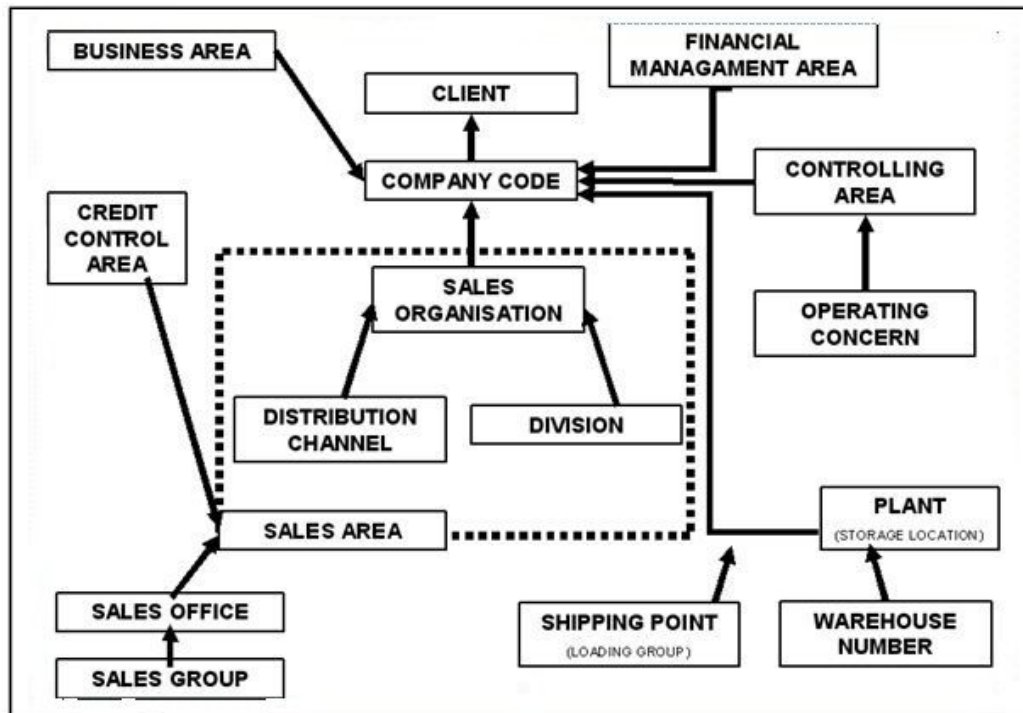
Sales and Distribution Structure :

- Client
- Company Code
- Sales Area
 - Sales Organization
 - Distribution Channel
 - Division
- Plant

- Shipping Point
- Loading Point

Internal Sales Structure :

- Sales Offices
- Sales Groups
- Sales Person



CLIENT :

- A client is an independent organizational unit.
- A client is considered a synonym for a group.
- A client is self-contained technical unit.
- General data & tables used for several organization structure are stored at the client level.
- Client is positioned in the highest level in Enterprise Structure.
- Several company code can be uniquely assigned to a client.

COMPANY CODE :

- A Company Code is a legal entity & independent accounting unit.
- Balance Sheet & Profit & loss account are created at Company Code level.
- Company Code is organizational unit prepared by FI.
- Several Company Code can be uniquely assigned to a Client.
- Several Company Code under same client can have same chart of accounts.

SALES ORGANIZATION :

- Sales Organization is an organizational unit of Logistics, which groups the enterprise according to the requirement of Sales & Distribution.
- Sales Organization distributes goods & services.
- Sales Organization is liable for sold products, responsible for the customers right of recourse & negotiating sales condition.
- One or more Sales Organization can be uniquely assigned to a Company Code.
- Sales Organization can be assigned to one or more plant. This assignment is not unique, so several Sales Organizations can also be assigned to one plant.
- Each Sales Organization has its own master data, for eg customer & material master data, as well as conditions, pricing & output type.
- A Sales Organization is the highest level (after the Client) to which sales figures are summed for SD with statistics currency.
- Sales Organization can be used as selection criteria for listing of sales document, as well as for creating delivery & billing worklist.
- Different output type can be defined for sales & billing document, for each Sales Organization.
- Sales Organization is also used to take regional, national, international subdivision of the market into account.

DISTRIBUTION CHANNEL :

- A Distribution Channel is a means through which saleable material or services reach the customer.
- A Distribution Channel represents the strategies to distribute goods and / or services to the customers. Eg: wholesale, retail, institutional, etc.

- Distribution Channel can be assigned to one or more Sales Organization.
- Same customer can be served through one or more Distribution Channel, within a Sales Organization.
- Distribution Channel can be set as per company's marketing strategies or internal organization.
- Master data can vary (Customer & material Master data, Prices, discounts / surcharge, output type, etc) for each Sales Organization & Distribution Channel, i.e, within Distribution Channel master data can be defined separately.
- Master data created for one Distribution Channel can also be used in other Distribution Channel.
- Different sales document type can be defined for Distribution Channel.
- Sales Office can be assigned to Distribution Channel.
- Items in a delivery & billing documents can belong to different Distribution Channel.
- Distribution Channel can be used as selection criteria for creating lists.

DIVISION :

- Division represents a product line or grouping of materials or services.
- Division can be assigned to one or more sales organization.
- Division can be assigned to one or more distribution channels.
- Material always belongs to only one Division.
- Master data can vary from Division to Division.
- Different Division can share the same master data, if shared master data is created.
- Sales Office can be assigned to Division .
- In sales document type, if Item Division is not activated, it will accept material from the Division at header level only & if material at item level is from different Division from header level, the same is not accepted.
- Item in delivery or billing can belong to different Division.
- Division can be used as selection criteria in sales document & also for creating delivery worklist.
- Different output type can be used for printing sales document for each Division.

SALES AREA :

- Sales Area is made up of combination of Sales Organization, Distribution Channel & Division.
- It defines the distribution channel sales organization uses to sell products from a certain division.
- A Sales Area belongs to only one Company Code.
- During the processing of SD documents, system accesses various master data, according to Sales Area. The system also carries out various checks concerning the validity of certain entries according to Sales Area.
- Sales document, delivery document & billing document is always assigned to Sales Area.
- Each SD document is assigned to exactly only one Sales Area. This assignment cannot be changed.
- Various analyses can be carried out within Sales Area. So, Organization structure should be as simple as possible.
- Sales Area is used for reporting & pricing.
- The customer data record contains pages (views) with the data that is specific to Sales Area.

PLANT & STORAGE LOCATION :

- In SD, a Plant represents the location from which material & services are distributed & correspond to a distribution centre. Which is also known as Delivering Plant. The relevant stocks are kept here.
- In SD, the Plant has a central function.
- At least one Plant is necessary in order to be able to use SD module.
- A Plant is uniquely assigned to a Company code.
- Assignment between Sales organization & Plant is not unique.
- Delivering Plant is important for determining shipping point.
- For a Plant to deliver goods to the customers, it must be configured appropriately as a delivering plant in SD customizing.

- It is possible that a Plant in one company code may have transaction with sales organization in another company code within the same client. This is known as ***Cross Company Sales***.
- Plant & Storage location are organizational units that can be used by all logistic area in the system.

DELIVERING PLANT :

For a plant to be Delivering Plant, following are essential, i.e,

- A plant is referred as delivering plant, when the said plant is assigned to a combination of Sales Organization & Distribution Channel.
- Plant should be uniquely assigned to a company code.
- Plant should also be assigned to sales organization & distribution channel.
- During the sales process, Delivering Plant is first used to verify stock (availability check) & later to supply the goods the customer has ordered.
- Only if plant is a Delivering Plant, a shipping point can be assigned to a plant. Material cannot be despatched without a shipping point.

SHIPPING POINT :

- The Shipping Point is highest level organizational unit of shipping that controls shipping activities.
- Material can enter or leave the premises of an organization through Shipping Point.
- System determines Shipping Point on the bases of Delivering Plant, Shipping Condition from Sold to Party & Loading Group from material master.
- The transaction code OVL3 is used to maintain the determination of shipping point.
- Shipping Point can be changed manually, only if it is in close proximity & relevant changes are permitted by the system in customizing setting.
- Each outbound delivery is processed by only one Shipping Point . For example, Loading ramp, mail depot, rail depot, group of employees, etc.
- Shipping Point is assigned to a plant.
- Shipping Point is a physical place & should be near delivering plant.
- Shipping Point can be assigned to more than one plant & a plant can also have more than one shipping point. Assignment between plant & shipping point is not unique.

WAREHOUSE :

For efficient processing of goods receipt & goods issue, Warehouse is made up of:

- **Warehouse number** : The entire warehouse structure is managed under one warehouse number.
- **Storage type** : The different warehouse area, which differ with respect to their organizational & technical features, are defined as storage types.
- **Picking area** : The picking area groups storage bins together in the storage type.
- **Staging area** : The staging area is an area in the warehouse where the goods are stored immediately after unloading or shortly before loading.
- **Doors** : A door within a warehouse can be used both for inbound delivery as well as outbound delivery of goods.

For Sales & Distribution, Lean Warehouses are applicable. This because lean warehouse have fixed bins as storage type.

BUSINESS AREA :

- Business Area represents an organizational unit, which can carry out internal reporting.
- A company code can be divided into multiple Business Area.
- A Business Area may also be shared by several company code & in such case, business area must have the same description in all company code.
- Business Area can be used to prepare balance sheet & Profit & loss statement not only for company code, but also for other internal area (eg: division).

SALES OFFICE :

- Sales Office is organizational unit responsible for sales & distribution, within geographical area.
- Sales Office establishes contact between company & customer.
- Sales Office can be assigned to one or more sales area.
- A Sales Office can be subdivided into several sales groups.

SALES GROUP :

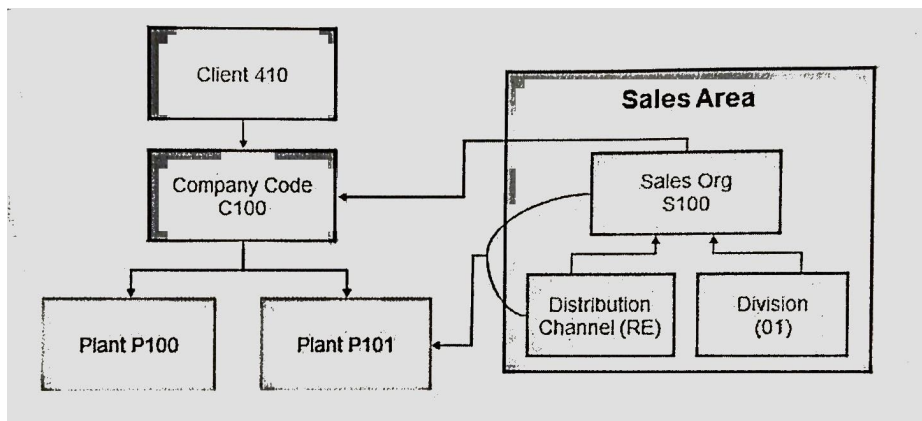
- Sales Group is an organizational unit that carries out sales & is responsible for the process internally.
- Sales Group can be assigned to one or more sales office.

SALES PERSONS :

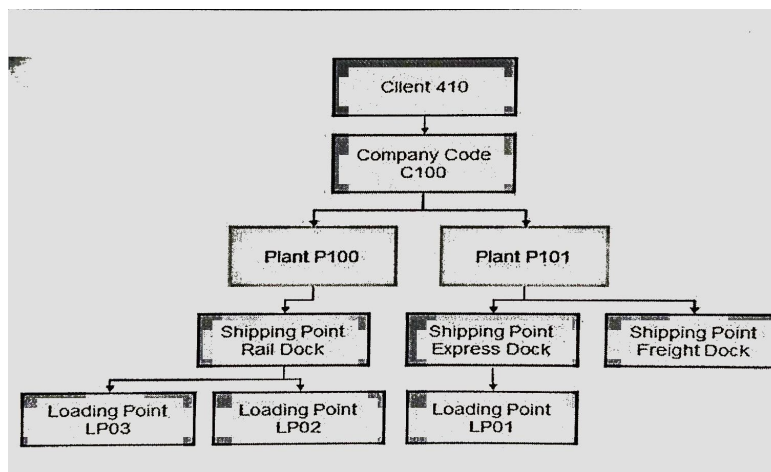
- A sales group consists of certain number of Sales Person.
- A Sales Person is assigned to a sales office & sales group in the sales employee record.

SAP R/3 system can represent a complex enterprise structure. Its flexibility can integrate the structure of an enterprise by linking its organizational unit. Enterprise structure design is a fundamental process in a SAP implementation project. The design is mainly determined by the business scenarios performed in an enterprise. Once the design is determined, it will affect many things such as how to perform a transaction and generate reports on SAP system. Although it's possible, it requires great effort to change the enterprise structure. So , we must ensure that the enterprise structure designed in the SAP implementation project can accommodate all business scenarios and enterprise's requirements for current and future situation.

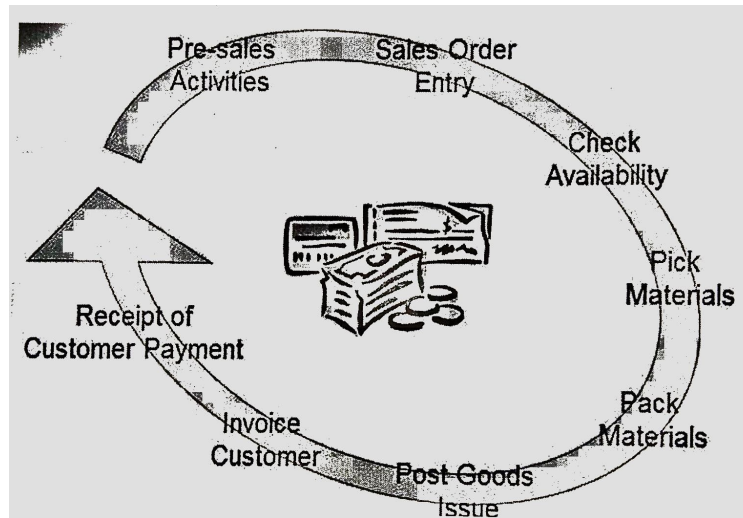
Structure Of Sales Processing



Structure Of Distribution



Sales Process



Human Resource Module

- Organization Structure
- Departmental Structure

A group of positions where a position has a reporting structure will be defined as an Organizational Unit. Organizational Units will be marked as Departments and Divisions, Cost Centres will be attached to Org units / Positions. GSFC is structured on the basis of Departments, Sub Division Offices and Staffs. Hierarchy Levels are defined as per the reporting Structure under Organizational Unit. This process is aimed at defining a simple role structure for the company by which jobs and positions for every person will be defined in the company, as well as the organizational unit to which they belong.

Jobs (Responsibilities & Duties)

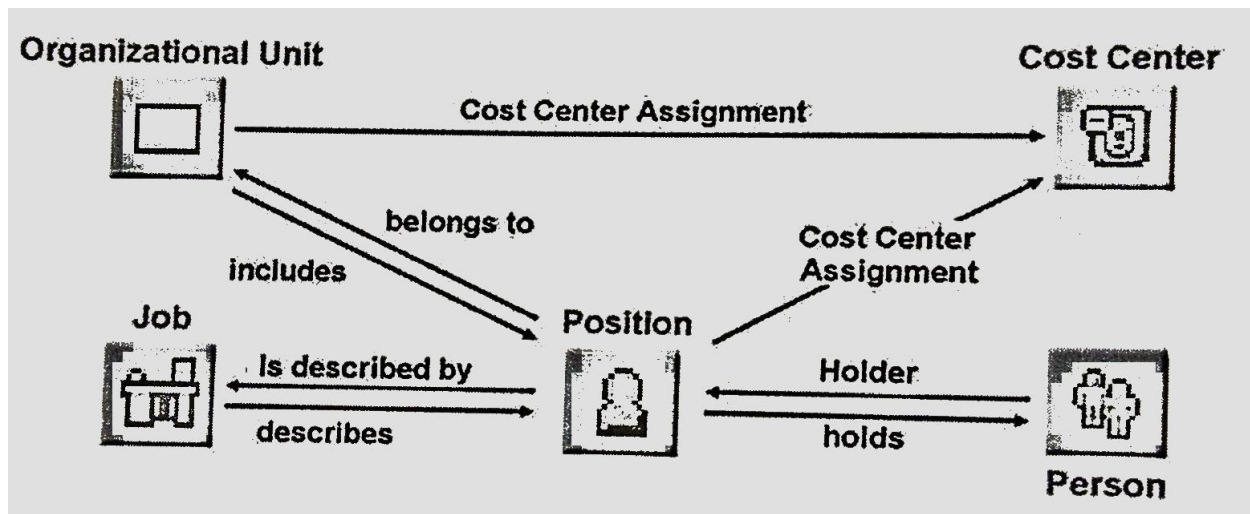
Jobs are the general Classifications for set of responsibilities and duties that an employee required to perform. Job is assigned to different positions on the basis of the amount of work to be performed. Jobs will be attached to positions.

Actions Performed In HR Module

- Hiring
- Re-Hiring
- Confirmation
- Re-Designation
- Transfer
- Promotion
- Disciplinary Action Inactive
- Disciplinary Action Active

- Demotion
- Change in Pay
- Reinstate
- Extension
- Promotion & Transfer
- Deputation

Organization Structure Of HR Module



Transaction Code (T-Code)

A Transaction Code (T-Code) consists of letters, numbers or both and is entered in the command field at the top of the SAP screen. Each function in SAP ERP has an SAP Transaction code associated with it. It is used to access functions or running programs in a SAP Application.

There are 2 types of T- Codes :

- **Standardize :**

Standardize are inbuilt T-Codes given from SAP Software itself which initially starts with A to X. For Example :

- For Create, Change Delete Program : SE38
- For Display Tables : SE16 OR SE16n
- For Create, Change, Delete T-Codes : SE93

- **Customize :**

Customized are user defined which starts from initial letter Y and Z. For Example :

- **ZAMPAS** : To print Invoice
- **ZNVEN** : To Upload Approved Vendors

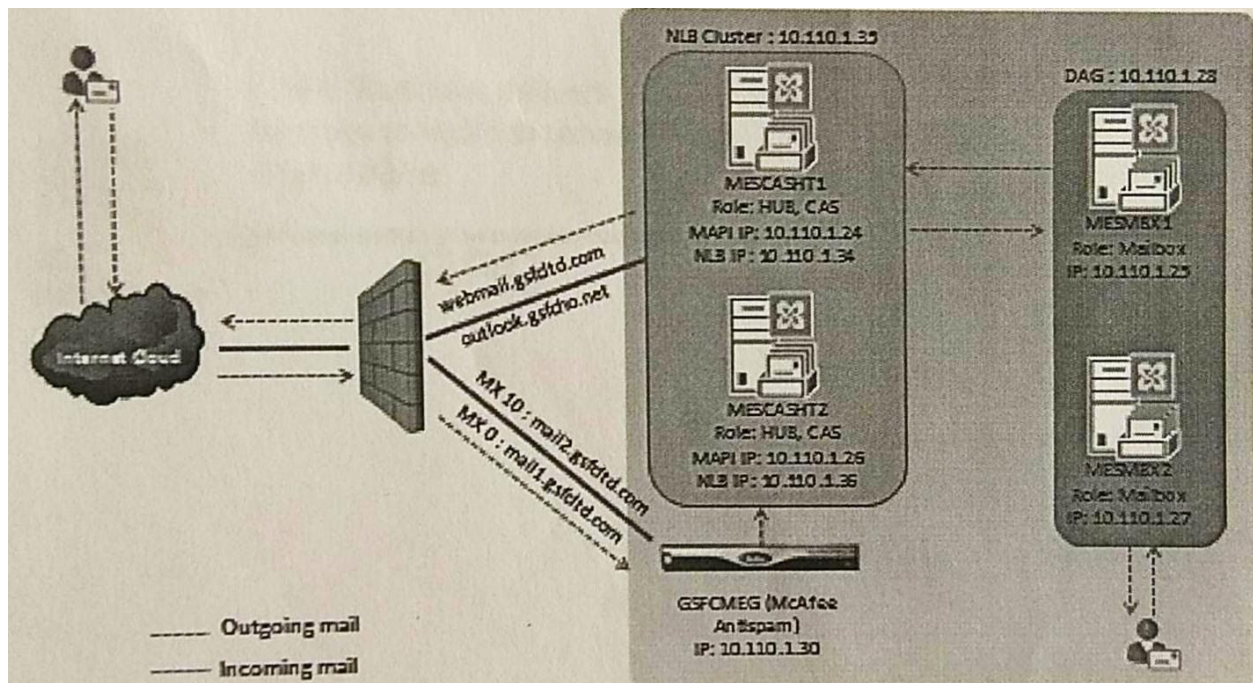
One Methodology for understanding the T-Codes is :

- **Ending With 1** : To Create
- **Ending With 2** : To Change
- **Ending With 3** : To Display
- **Ending With 5** : To Block

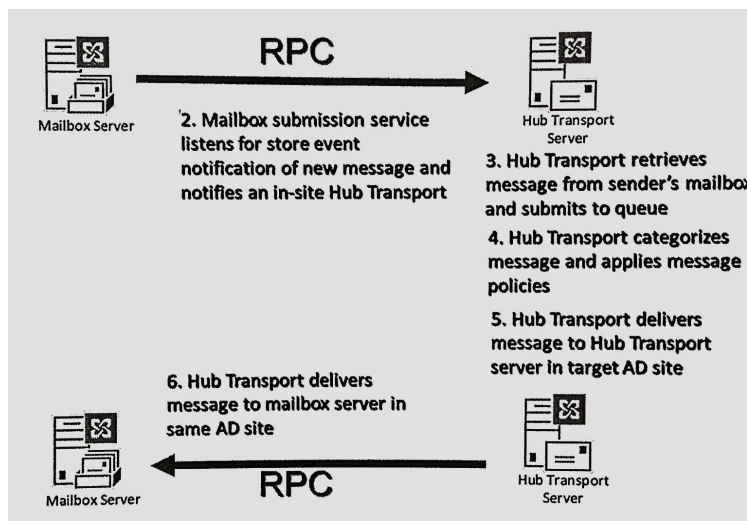
GSFC : Exchange Architecture

GSFC Mail Architecture

Exchange is nothing but just a mediator to send-receive email from one source to another. We can also control mail flow via Exchange Server. We also get the benefit of calendaring i.e scheduling meeting, appointment, check free-busy, room booking, set auto-response in room mailbox, contacts, mobile privacy via Exchange ActiveSync, RPC over HTTP, Mailbox Delegation etc. There is also other mail server tool which are familiar in market like Lotus Domino, Zimbra, Qmail, hmail Server, Smarter Mail etc.



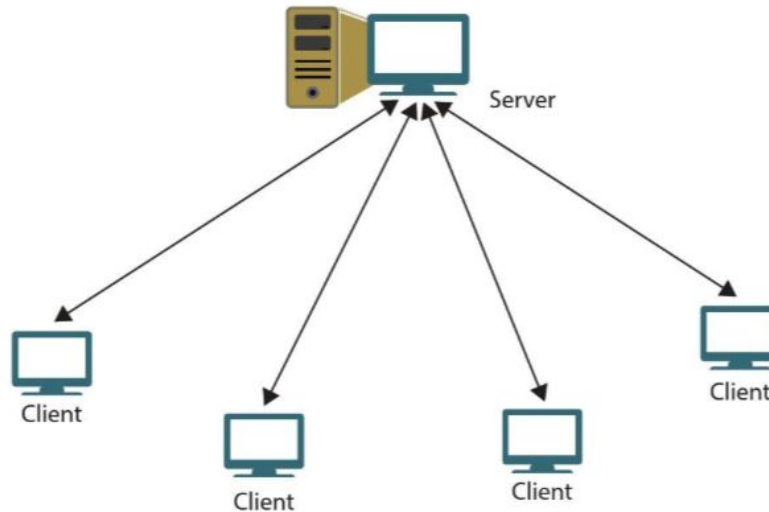
Message Delivery Flow



Networking Basics

Computer Network

A **Computer Network** is a group of two or more computers interconnected via cables or through wireless mode, for sharing hardware and software resources. These resources can be printers, CDs, e-mails or any software.

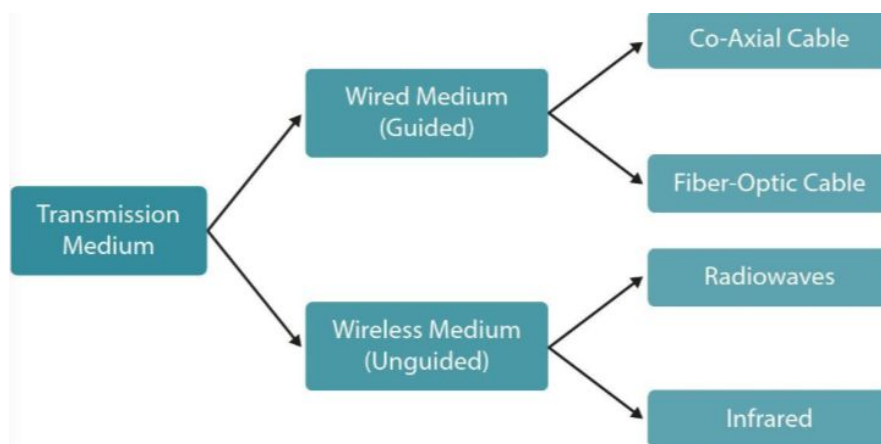


A network must meet a certain number of criteria. The most important criteria are :

- Performance
- Reliability
- Security

Medium Of Data Transmission

Data is transmitted using specially designed network cables either made of copper or fibre. Bandwidth, delay, installation and maintenance costs are some of the characteristics of any transmission medium.



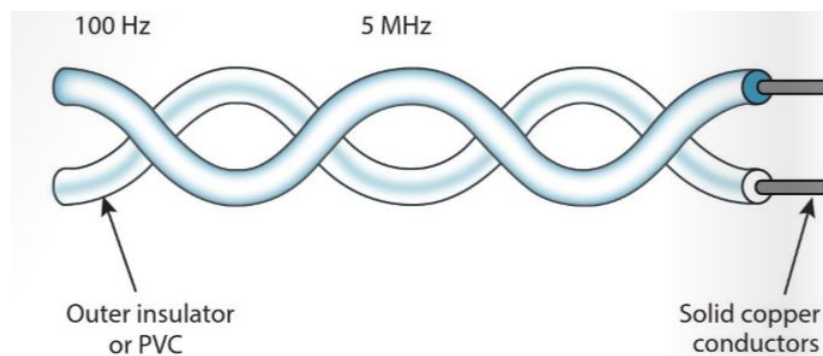
There are 2 main types of Transmission medium :

- **Wired :**

Wired medium has a defined physical path for transmitting signals because it is made up of physical cables. There it is also known as **Guided Medium**. There are 3 types of cables which are mainly used in wired medium :

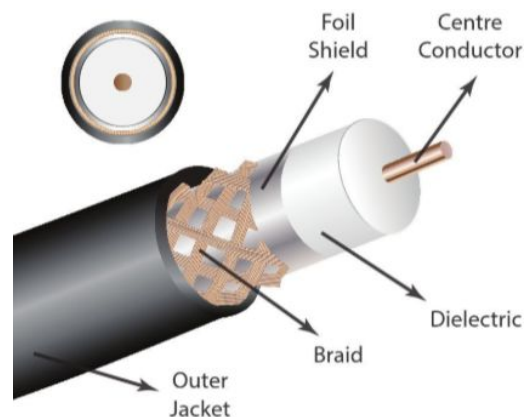
→ **Twisted Pair Cable :**

- ◆ Copper based cable
- ◆ Further categorized as **Shielded Twisted Pair (STP)** & **Unshielded Twisted Pair (UTP)** cables.



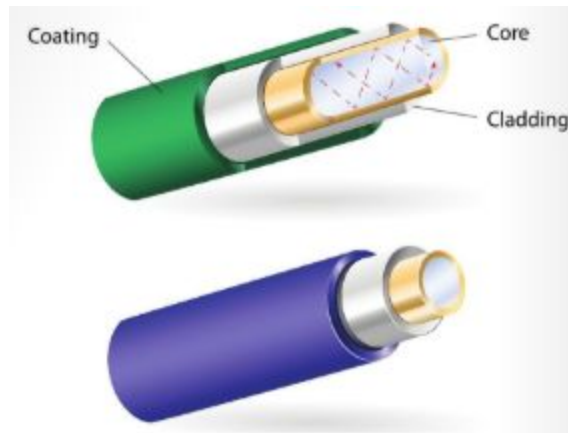
→ **Coaxial Cable :**

- ◆ Also copper based cables
- ◆ Carry electronic waves
- ◆ Further classified into 3 categories :
 - Hard Line
 - Radiating
 - RG-6
 - Triaxial Cable



→ **Fiber Optics Cable :**

- ◆ Carry light waves
- ◆ Have very high bandwidth capacity and high speed
- ◆ Noise resistant and Low maintenance cost
- ◆ Work on principle of Total Internal Reflection
- ◆ Has 3 parts :
 - CORE
 - CLADDING
 - COATING



→ **Wireless :**

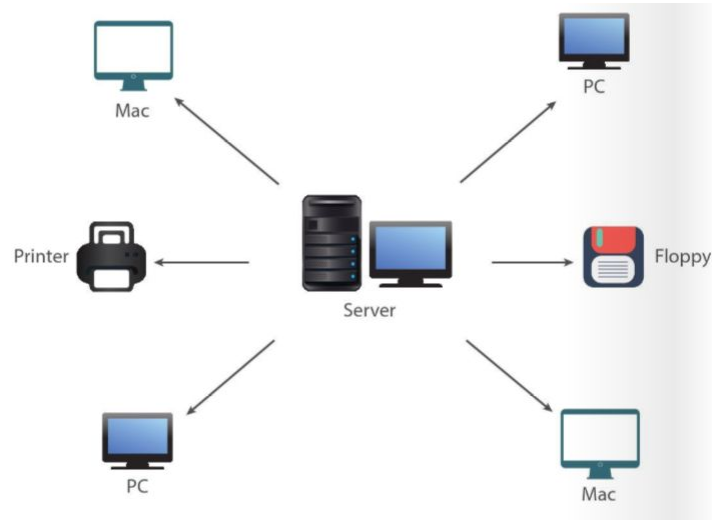
- ◆ Unguided Medium
- ◆ Uses Antenna for data transmission
- ◆ Uses Radio waves, microwaves and infrared waves to transmit data
- ◆ Affected by adverse weather conditions

Classification Of Network Based On Size

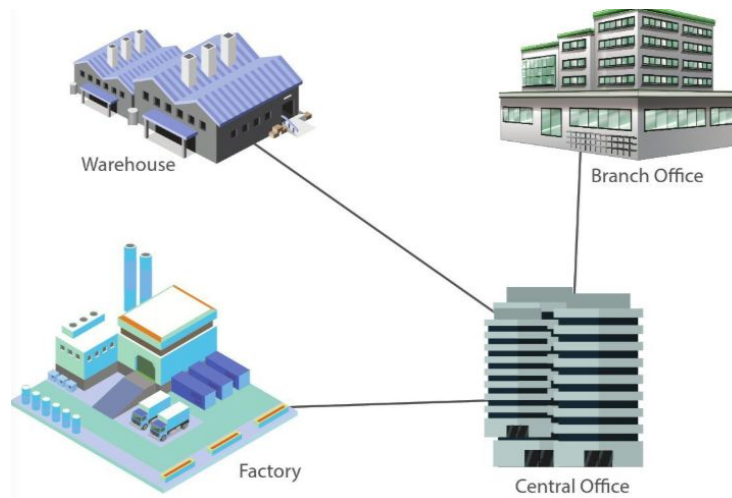
A computer network can be established on the geographical area it covers. According to the area, specific protocols are followed to set up a network.

On the basis of physical size, a network can be classified as follows :

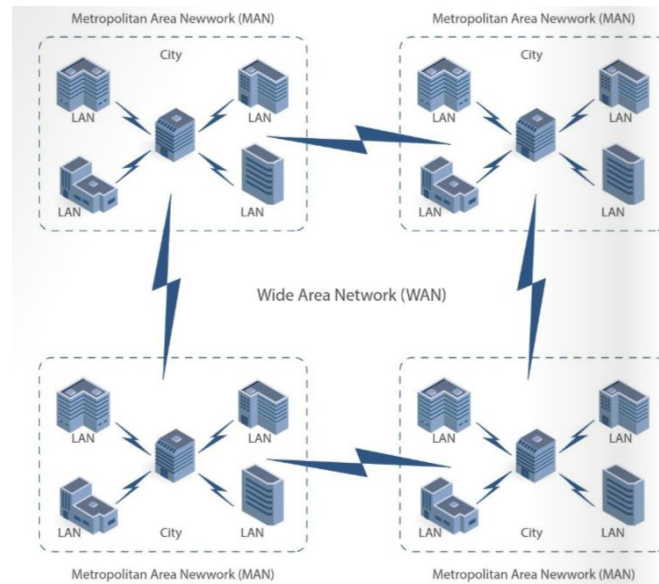
- **Personal Area Network (PAN) :**
 - Used for personal data intercommunication
 - Exchange of data between personal devices
- **Local Area Network (LAN) :**
 - High speed private network at low costs
 - Covers relatively small area
 - Area is confined to a single building or a group of buildings within a campus



- **Metropolitan Area Network (MAN) :**
 - Covers entire city or town
 - Covers larger area than LAN covers
 - Installation cost is high



- **Wide Area Network (WAN) :**
 - Covers a geographical location like state or country
 - It is public or private owned networks

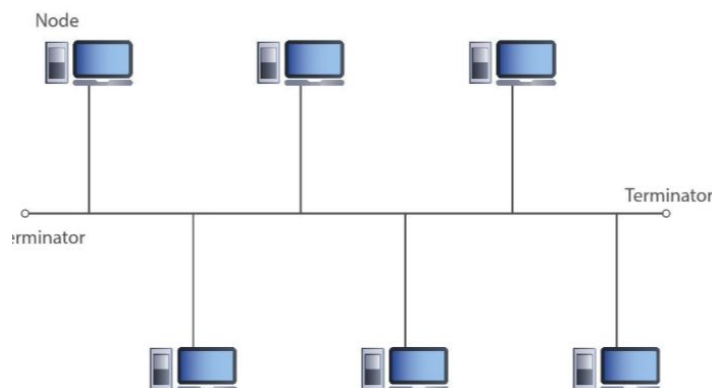


Classification Of Network Based On Topology

A **Topology** is defined as the arrangement of network nodes, cables etc in a computer network. Mainly 6 kinds of topologies are used in Network.

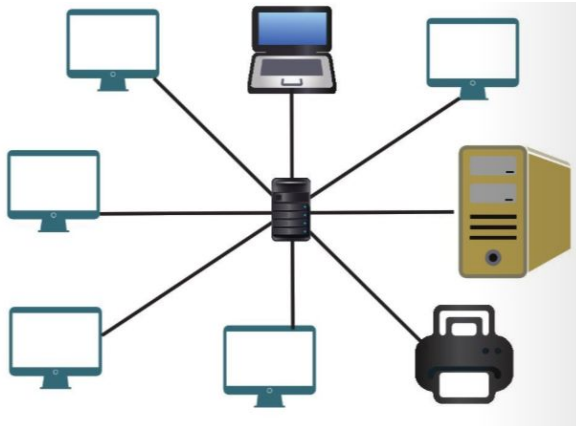
- **Bus Topology :**

- Each node communicates with the other node through this bus
- This topology uses single cable
- Terminator is connected at the end points of the back bone to avoid bouncing of signals
- Easy to install and low installation costs
- Unsuitable for high traffics of data
- Higher maintenance cost



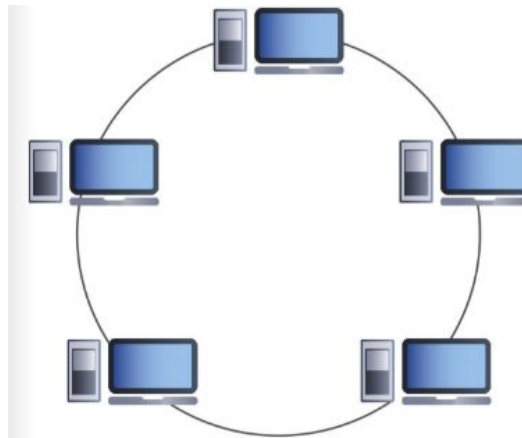
- **Star Topology :**

- A central node transmits messages to all the other nodes
- Each node is connected to the central node
- Central node is often a **Hub** or a **Switch**
- If central node goes down, the entire network fails



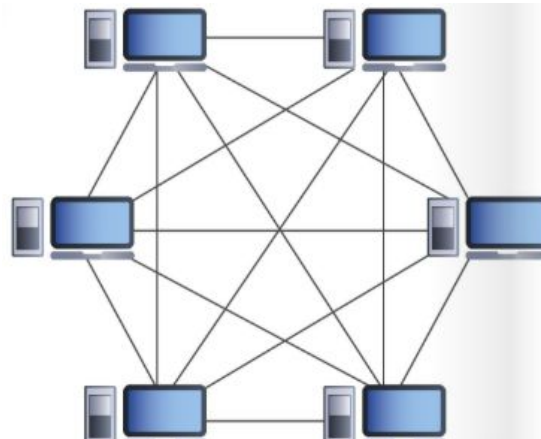
- **Ring Topology :**

- Each node is connected to 2 other nodes forming a circular shape or a ring
- Reduce chance of collisions
- Higher data transfer rate
- More expensive



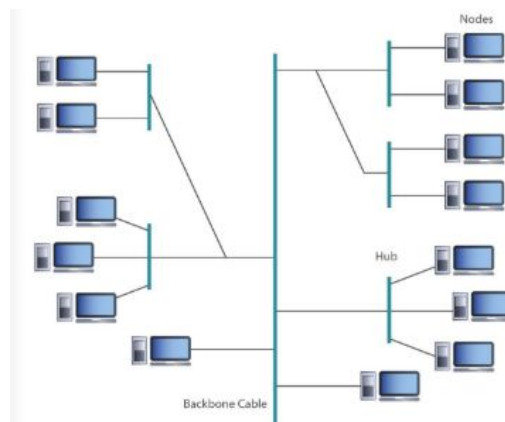
- **Mesh Topology :**

- Each node is connected with each and every node present in the network.
- Has a dedicated point to point network between each device
- Suitable for high data traffic
- Robust and Reliable
- High installation and maintenance cost
- Higher redundancy



- **Tree Topology :**

- Appears as **Star Topology** network is connected using **Bus**
- Backbone cable signifies the stem of the tree
- Also known as **Extended Star Topology**
- Easy maintenance
- Error detection and correction is easier
- Fault in backbone causes entire network failure



- **Hybrid Topology :**

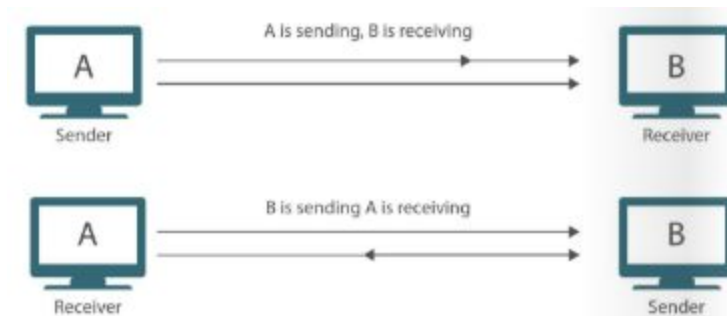
- Consists of a combination of 2 or more than 2 different network topologies
- High level of fault tolerance
- Expensive to install and maintain
- Reliable

Transmission Modes

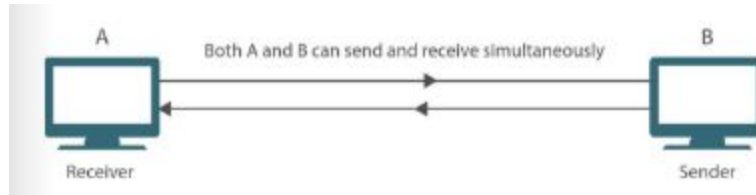
Transmission modes depict the direction of the data flow between interconnected network nodes during data communication. These are also known as **“Communication Modes”**.

There are 3 types of transmission modes :

- **Simpex** : Data flow is unidirectional i.e either from sender or from the receiver
- **Half Duplex** : Data flow is bidirectional i.e transmission between sender and receiver but not simultaneous



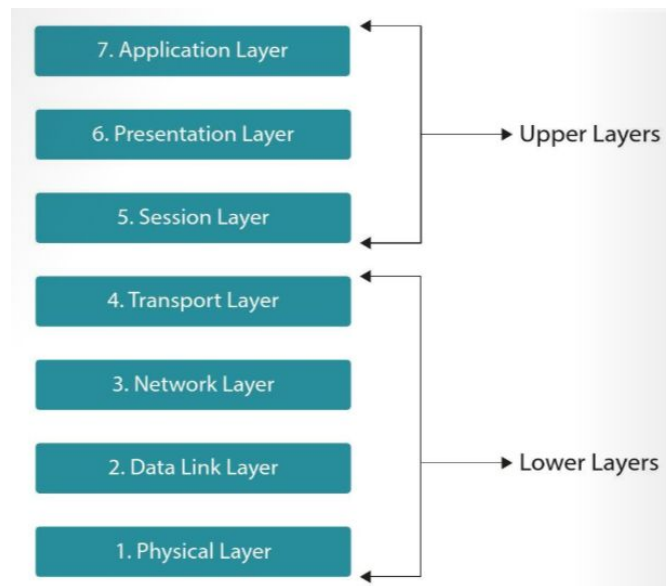
- **Full Duplex** : Data flow is bidirectional i.e transmission between sender and receiver and is simultaneous



Open System Interconnection (OSI) Model

The **Open System Interconnection (OSI) Model** describes how a software application in one computer sends information to a software application on another computer. This model was developed by the **International Organization Of Standardization (ISO)**. This model is composed of 7 separate but dependent layers :

- **Application Layer**
- **Presentation Layer**
- **Session Layer**
- **Transport Layer**
- **Network Layer**
- **Data Link Layer**
- **Physical Layer**



The Lower Layers (Layers 1, 2, 3 and 4) are network support layers. These layers take care of formatting, encoding and data transmission.

The Upper Layers (Layers 5, 6 and 7) are user support layers. These layers deal with application issues

Physical Layer

- Carries a bit stream over a physical medium
- Interface between **Data Terminal Equipment (DTE)** and **Data Communication Equipment (DCE)** is defined in this layer.

Data Link Layer

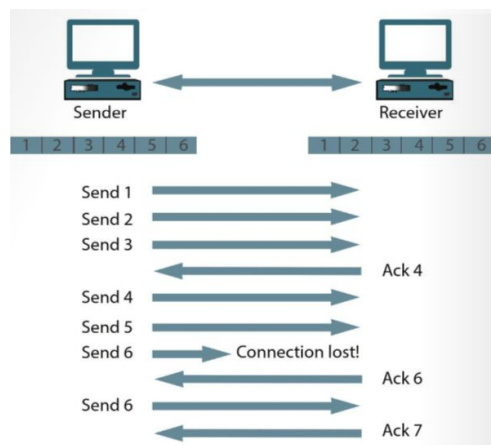
- Makes transmission of data error free
- Handles error control and flow control of the data
- Converts physical layer into reliable link
- Further divided into 2 sublayer :
 - **Logical Link Control (LLC)** : Responsible for flow control, error control and part of framing
 - **Media Access Control (MAC)** : manages protocol access to the physical network medium

Network Layer

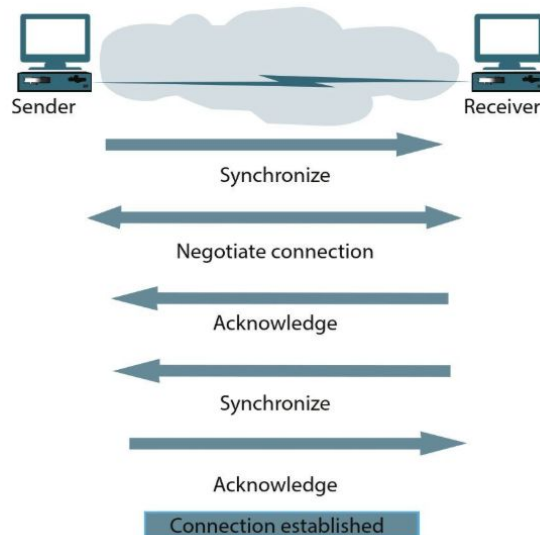
- Manages Logical addressing
- Tracks the location of the nodes
- Determines the best way to transfer the data
- Deals with Logical **Addressing** and **Routing**

Transport Layer

- Process to process delivery of the packet. Here process is the application running on the host
- Ensures that the packet arrives in order and checks both error control and flow control
- Transport layer also deals with the following :
 - **Service-Point Addressing :**
Source to destination delivery implies delivery of packets from one specific point to another. At that time, the transport layer header includes a new type of address known as **Service-Point Address** or **Port Address**.
 - **Segmentation & Assembly :**
Packets in the Transport layer are divided into segments. Each segment contains a sequence of numbers which helps in sequential delivery of messages and replaces the lost packets.
 - **Connection Control :**
Communication provided at the Transport Layer can be either **Connectionless** or **Connection Oriented**. In Connectionless, the Transport Layer sends each segment independently to the destination. In Connection Oriented, the Transport Layer first establishes the connection and then delivers the packet.
 - **Flow Control**
 - **Error Control**
- The **Acknowledgement (ACK)** is sent by the receiving side for each collection of packets that have arrived safe and error free. The corrupted packets and the duplicate packets are discarded and the lost packets are detected by using a timer. If an **ACK** is not received by the sender before the timer expires, then the sender resends the packet.



- When the sender has sent the data and is waiting for the acknowledgement, there is some time available. The sender uses this opportunity to send some more data. The data which can be sent without receiving acknowledgements are stored in the buffer and is processed using a window. This process is called **Windowing**.
- **Connection Oriented Sessions :**
To achieve a reliable transport of data, the devices need to set up a **Connection-Oriented Session**. A Connection Oriented Session can be achieved by **3-Way Handshaking**.
 - First the client and server need to establish a connection before transporting the data
 - Sender sends the request for synchronisation.
 - The receiver sends the rules and negotiates for the connection. After negotiation, the receiver sends an acknowledgement and sends the request for synchronisation.
 - Then sender also sends the acknowledgement and the connection is established



- A session is said to be Connection Oriented if it uses :
 - 3 Way Handshaking
 - Sequence Numbers
 - Acknowledgments
 - Flow Control

Session Layer

- Responsible for establishment, maintenance and synchronization of the interaction between communicating systems.

Presentation Layer

- Deals with the syntax and the semantics of the information exchanged between the two systems.
- Ensures that the data is readable between the applications of 2 systems.
- It also deals with :
 - **Translation**
 - **Encryption**
 - **Compression**

Application Layer

- Responsible for providing services to the user.
- Provides user interface and services to the user.
- Also provides the following services :
 - **Network Virtual Terminal**
 - **File Transfer, Access and Management**
 - **Mail Services**
 - **Directory Services**

TCP / IP Protocol Suite

TCP/IP Protocol Suite has 4 layers :

- Host To Host Network
- Internet
- Transport
- Application

Each of the above mentioned layers contains one or more protocols. TCP/IP Protocol is also referred to as ***Department of Defences (DOD) Model***.

Image :

Application Layer

- Provides process-to-process communication and the user interface specifications.

Transport Layer

- Provides the functions of OSI's Transport Layer and defines the protocols for reliable end to end communication and error free delivery of data.
- Maintains data integrity and sequence of packets.

Internet Layer

- Monitors data exchange between the host and the network.
- Also handles hardware issues and defines protocols for physical transmission of data.

Important Protocols Used In TCP/IP Protocol Suite

- **Simple Mail Transfer Protocol (SMTP)**
 - Used for sending and receiving emails
 - Used with either **POP3** or **IMAP**
 - **SMTP** is used for sending emails, while **POP3** or **IMAP** is used for receiving emails.
 - Operated over **Internet Port 23**.
- **File Transfer Protocol (FTP)**
 - Used for transmitting files between computers on the internet over TCP/IP Connections
 - It is a **Client-Server Protocol**
 - Operated over **Internet Ports 20 & 21**
- **Hypertext Transfer Protocol (HTTP)**
 - Used to define how to manage the communication between Web Servers and Browsers
 - Underlying Protocol used by the **World Wide Web**
 - Operated over **Internet Port 80**
- **Hypertext Transfer Protocol Secure (HTTPS)**
 - Used to create a secure channel over an insecure network
 - Ensures protection from **Eavesdroppers** and **Man-In-The-Middle Attacks**
 - Uses **Secure Socket Lock (SSL)**
 - Operated over **Internet Port 443**
- **Domain Name System (DNS)**
 - Resolves the Internet Domain Names to their IP Addresses.
 - Operated over **Internet Port 53**
- **Simple Network Management Protocol (SNMP)**
 - Used in network management and network monitoring
 - Used for exchanging management information between network devices
 - Operated over **Internet Port 444**

- **Teletype Network (TELNET)**
 - *Used for accessing the remote computers*
 - *Operated over **Internet Port 23***

- **Transmission Control Protocol (TCP)**
 - *Connection Oriented, full duplex and reliable protocol*

- **User Datagram Protocol (UDP)**
 - *Connectionless and unreliable transport protocol*
 - *Packet in UDP is called **Datagram***
 - ***Cyclic Redundancy Check (CRC)** is used to check the header and data field*

- **Internet Protocol (IP)**
 - *Connectionless and Unreliable Protocols*
 - *Protocol tries to complete a transmission, but there is no absolute guarantee for completion*

- **Address Resolution Protocol (ARP)**
 - *Find physical address of the host or router when its logical address is provided*

- **Reverse Address Resolution Protocol (RARP)**
 - *Used when a machine wants to learn its own IP Address*

- **Internet Control Message Protocol (ICMP)**
 - *Helps IP send the notification about the problems while routing a packet*

Ethernet Cabling

The UTP Cable has eight wires in it. There are 3 types of implementation used for the pinouts of two sides of the wire :

- Straight Through
- Cross Over
- Rolled Cable

The wire colors used are :

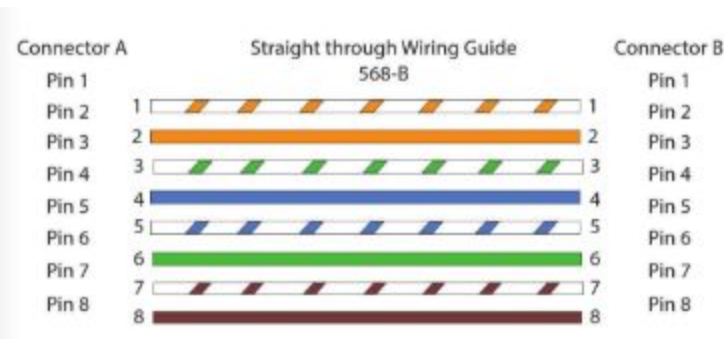
- White & Orange Stripped
- Solid Orange
- White & Green Stripped
- Solid Blue
- White & Blue Stripped
- Solid Green

- White & Brown Striped
- Solid Brown

Straight Through Cable

A **Straight Through Cable** is used for **DTE-To-DCE (Data Termination Equipment To Data Communications Equipment)** connections. It is used to connect :

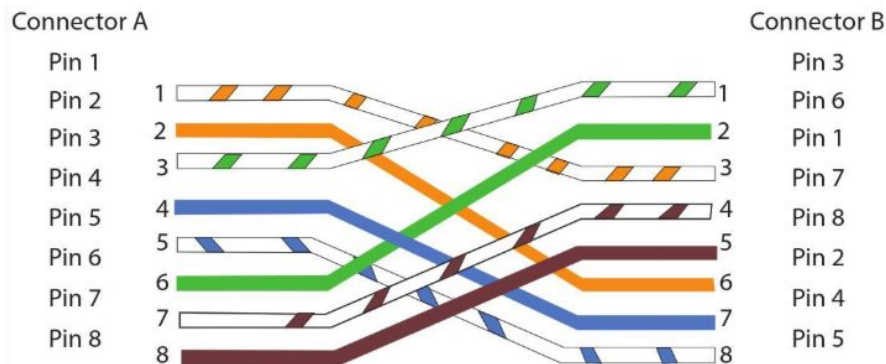
- Host To Switch OR Host To Hub
- Router To Switch OR Router To Hub



Crossover Cable

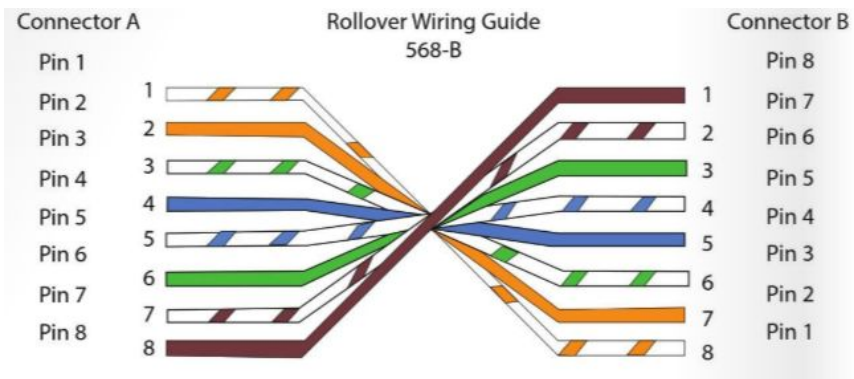
2 sets of wire crossover : for example, pin 1 on one side is connected to pin 3 on the other side and pin 2 on one side is connected to pin 6 on the other side. It is used to connect :

- Switch To Switch
- Hub To Hub
- Host To Host
- Hub To Switch
- Router direct To Host



Rolled Cable

It is also called **Patch Code Cable**. It is used to connect the host to router console serial communication port. They have opposite pin assignments on each end of the cable i.e pin 1 on one side is connected to pin 8 on the other side, pin 2 is connected to pin 7 and so on

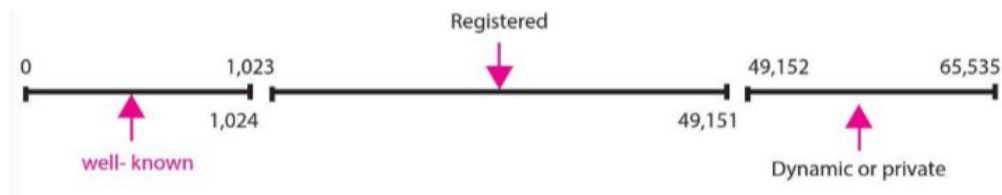


Addressing

TCP/IP addressing involves 4 types of addresses. These addresses are :

- Physical Address
- Logical Address
- Port Address
- Application Specific Address

In each network, there is a network address that uniquely identifies a network. Every node in the same network shares the same network address. The node address is assigned uniquely to every node. For Example, in the IP address 172.168.25.26, 172.168 is the network address and 25.26 is the node address.



Designers have made classes based on the network sizes which are as follows :

- **Class A :** 0 to 126
- **Class B :** 128 to 191
- **Class C :** 192 to 223
- **Class D :** 224 to 239
- **Class E :** 240 to 255

127 is used for **Packet Transfer Testing**.

Class A Address

The first octet represents the network address and the remaining three octets represent the node addresses. Class A address format is like : **network . node . node . node**

The first bit of the first octet must always be 0, which implies that only 7 bits are used as network identifier. This means that Class A Address has only 128 (2^7) networks.

Class B Address

The first two octets represent the network address and the last two octets represent the node addresses. Class B address format is like : **network . network . node . node**

The first bit of the first octet must always be 1. Class B address can only have 16,384 (2^{14}) network addresses.

Class C Address

The first three octets are assigned to network addresses and the last octet shows the node address. Class C address format is like : **network . network . network . node**

The first two bits of the first octet must always be 1 and third bit must be 0. Class C address can have only 2,097,152 (2^{21}) network addresses.

Class D & E Address

The addresses between 224 and 255 are reserved for Class D and E networks. Class D is used for multicast addresses and Class E is used for scientific purposes.

Subnetting

With the growth of the internet, there was a need for larger address spaces. This could only be achieved by increasing the length of the IP addresses. But this means that the format of IP address needs to be changed. For this, a short term solution was provided, which is known as **Classless Addressing**. Subnetting refers to a logical division of an IP address.

Subnet Masks

A Subnet Address is created from host address by assigning a **Subnet Mask**. A 32 bit value allowing a receiving node to discern network address and host address is termed as a **Subnet Mask**. It contains 1s and 0s, 1 refers to subnet or network, and 0s refer to the host and 255 is assigned to a broadcast address.

Subnet Masks of different class addresses are as follows :

- **Class A** : 255.0.0.0
- **Class B** : 255.255.0.0
- **Class C** : 255.255.255.0

Conclusions & References

Conclusion

I got the opportunity to learn about the workings of GSFC, about its product profiles, business processes of GSFC etc. I also came to know about SAP-System Application & Product in Data Planning, Its architecture, T-Codes, few modules of SAP implemented in GSFC and their working. I also learnt about web application and web designing using ASP.NET with C# and VB and also connecting it with the SQL Database. I was also given brief idea about networking in GSFC and learnt Networking Basics.

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