



# Module-C Unit-4

## JAIIB PAPER-2

### Principles and Practices of Banking (PPB)



## JAIIB PPB Module C Unit 4-Data Communications Networks and EFT Systems

### Data Communication Networks

Data communications helps in drastically cutting and the time involved in transferring data from the point of origin to the computer and information from the computer to the point of use.

#### Components of Data Communications Networks

Data communications typically consists of various data communication components. When the components operate together for the sharing of resources, they are said to form a network. It has three basic components.

#### Transmission Devices and Interface Equipment

The data is transmitted along the communication path between computer devices using electrical signals and bit sequences to represent number and characters.

**Modem:** A modem is a device or program that enables a computer to transmit data over, for example, telephone or cable lines. Computer information is stored digitally, whereas information transmitted over telephone lines is transmitted in the form of analog waves. A modem converts between these two forms.

#### Transmission Medium

For Communications between computers, the data has travel through some medium during its transmission. The prevalent technologies for data communications media are terrestrial, microwave and satellites.

##### (a) Terrestrial Cables (Three types)

- Twisted Pair
- Coaxial Cable
- Optical fibre

**(b) Microwave systems:** A microwave system is a system of gear used for microwave data transmission. The typical microwave system includes radios located high atop microwave towers, which are used for the transmission of microwave communications using line of sight microwave radio technology.

**(c) Communication satellite:** A satellite is a body that moves around another body in a mathematically predictable path called an Orbit. A communication satellite is nothing but a microwave repeater station in space that is helpful in telecommunications, radio, and television along with internet applications.

A repeater is a circuit which increases the strength of the signal it receives and retransmits it. But here this repeater works as a transponder, which changes the frequency band of the transmitted signal, from the received one.

The frequency with which the signal is sent into the space is called Uplink frequency, while the frequency with which it is sent by the transponder is Downlink frequency.

### Transmission Processors

The Purpose of communication processors is to enhance is to data communication between two points. Communications processors can be broadly categorized as:

- Message Switches
- Multiplexers
- Front end processors

### Modes of transmission

- Simplex
- Half- Duplex
- Full Duplex

### Network Scenario in India: Major Networks

The Committees on communication networks for banks, set up in 1987 under the chairmanship of “**T.N Anantharam Lyer**” executive director, RBI, had strongly recommended for the establishment of a cooperative communication network especially for the banking industry.

#### INET

- INET was set up by the department of telephones in the year 1991. It is a fast, reliable, flexible and quite cost effective data communication network.

#### NICNET

- NICNET has been set up by the National Informatics Centre (NIC), a Government of India organization. It is India’s largest Wide Area Network (WAN). The Master Earth station is installed in New Delhi, to provide access to satellites and operates from around 2000 VSAT terminals.

#### INDONET

- It was set up by CMC Ltd. In the 1980 and was among the first countrywide networks in India.

#### RBINet

- After recognising the pressing need to harness information technology for intra-bank and inter-bank communications in the **1980s, RBI commissioned the BANKNET in 1991.**

***RBI Net is also being used by several departments of banks for various applications such as:***

- **Transmission of section 42(2) of the RBI Act, 1934, data** by commercial banks to regional offices of department of banking operations and development (DBOD) and furnishing of consolidated data by the regional offices of DBOD to central DBOD.
- Press relations division daily news summary of important financial matters.
- Department of economic analysis and policy macroeconomic indicators on a weekly basis.

## **Emerging Trends in Communications Networks for Banking**

### **RBI's VSAT Network**

The Indian Financial Network (INFINET) is a Closed User Group (CUG) Network for the exclusive use of Member Banks and Financial Institutions. It was set up by the Reserve Bank in 1999 through the Institute for Development and Research in Banking and Technology (IDRBT) Hyderabad. The Institute explored capability, methods, procedure to expand the network using a blend of communication technologies such as VSATs and Terrestrial Leased Lines. In order to have a careful combination of technologies in the INFINET, a Leased Line Network (LLN), connecting 21 major cities has been seamlessly integrated with it. The LLN is a mix of 2 Mbps and 64 Kbps lines. The LLN provides gateways to banks from each of these 21 cities. The Network Management System (NMS) of the LLN is located at the INFINET Hub at Hyderabad. The Backup NMS is located in the Main Office of RBI in Mumbai

Among various inter-bank and intra-bank applications ranging from simple messaging, MIS, EFT (Retail), Electronic Clearing Service (ECS) for both Credits and Debits, online dealing and trading in Government securities, Centralized Funds Management System (CFMS) for Banks and Financial Institutions, Anywhere banking/Anytime Banking (ATM), Inter-Branch Reconciliation, Structured Financial Messaging System (SFMS) and Electronic Funds transfer (RTGS/NEFT) System, transmission of Inter-city Cheque Realisation advices, government securities trading, and currency chest accounting are done through this service. VSAT technology service can also be used for one-way and/or interactive communications via satellite. Presently, the network consists of over 950 VSATs located in 127 cities of the country. All Banks and financial institutions in the country are eligible to become members of the INFINET.

### **Internet**

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- Serial Line Protocol (SLIP)
- Point to Point Protocol (PPP)

### ***Internet Access Service***

- E-mail
- Usenet
- Gopher
- File Transfer Protocol (FTP)
- World Wide Web (WWW)

### **SWIFT (Society for Worldwide Interbank Financial Telecommunication)**

SWIFT message types are the format or schema used to send messages to financial institutions on the **SWIFT (Society for Worldwide Interbank Financial Telecommunication) network**. The original message types were developed by SWIFT and retrospectively made into an ISO standard, ISO 15022. In many instances, SWIFT message types between custodians follow the ISO standard. This was later supplemented by a XML based version under ISO 20022.

SWIFT India Domestic Services Pvt Ltd (“SWIFT India” or “the Company”), founded on similar principles, is a financial messaging services provider formed by SWIFT SCRL and Indian banks, for the domestic Indian financial community and by the community.

Through shared resources and capital, SWIFT India functions with the objective of enabling harmonised exchange of structured financial information between domestic participants in the domestic Indian community, thereby

- (a) Reducing costs and risks,
- (b) Expanding the reach of automated, standardised and secure exchange of information across the industry,
- (c) Enabling new instruments, opportunities and markets for the industry.

#### **Message types:**

- Real-time and bulk messages
- File transfer of structured and unstructured information

#### **Security:**

- Role-based access control
- Maker-checker controls

- 3 layers of asymmetric encryption to ensure integrity, authenticity and confidentiality
- Hardware security modules
- Support for local Controller of Certifying Authorities (CCA) licensed public key infrastructure (PKI)

#### **International and domestic standards:**

- Support for international ISO 15022 (MT) and ISO 20022 (MX) message formats, including domestic to international message transformation
- Support for local market practices and flows
- Support for local addressing schemes such as the Indian Financial System Codes (IFSC)

#### **Value added message features:**

- Guaranteed delivery
- Delivery confirmation and non-delivery warning
- Broadcast messages
- Syntax and rule-book message validation
- Non-repudiation proof of message transmission in case of dispute
- Message retrieval for 124 days in case of messages lost or corrupted by either sender or receiver
- Store-and-forward for when counterparties are not online

#### **Back-office integration for straight-through-processing**

- Message transformation
- Multiple protocols (including SOAP, MQ, file transfer, etc)
- Custom workflows

#### **Premium support**

- Standard 24/7 online and phone support
- Native support by back-office certified partners and services providers across Core Banking System, Treasury System, Cash Management Systems, Retail and Corporate Banking Systems. Payments Middleware and Enterprise Resource Planning Systems.
- Other premium support features such as onsite support, pro-active network monitoring and health checks, coordinated business continuity exercises, and others. Visit Support & Training for more information.

### **Automated Clearing System**

Most of the large banks in the European countries and the USA have independent communication networks. Other banks are also members of some of the networks on a sharing basis. These banks use distributed data processing techniques with a central system acting as the main database server. This has helped them to provide certain

specialised functions like transfer of funds, automated teller systems, and credit card systems in an online mode. CHIPS, CHAPS, CHATS are some of these networked systems which allow direct funds transfer facilities in the USA, UK and Hong Kong, respectively and are largely responsible for bringing about the true concept of Electronic Funds Transfer in these countries.

### **Clearing House Inter-Bank Payment System (CHIPS)**

- The CHIPS started operating in 1970, run by a New York clearing house, the world's premier system for transfer of payments internationally. Settlement failures in the history of CHIPS operation have never been reported, and the operational time is claimed to be 99.9 to 100 per cent.
- Most of the international fund transfers go through CHIPS, as most of the international trade is transacted in US dollars.

### **Clearing House Automated Payment System (CHAPS)**

- CHAPS is a sterling same-day system that is used to settle high-value wholesale payments as well as time-critical, lower-value payments. The CHAPS system set-up in the UK provides almost instantaneous service for the settlement of payments, and the payments are guaranteed on receipt and cannot be recalled.
- CHAPS is one of the largest high-value payment systems in the world, providing efficient, settlement risk-free and irrevocable payments.

### **Clearing House Automated Transfer System (CHATS)**

- CHATS provide inter-bank funds' transfer facilities in Hong Kong, which has long been regarded as the hub of financial activities the world over. The success of this system depends largely on reliable communication networks.
- CHATS provide the same day inter-bank settlement, instant online confirmation and enquiry facilities. All the inter-bank entries are first validated at entry before transmission to the CHATS central system for settlement.

## **Two-Level Funds Transfer System**

In USA, Fedwire, Bankwire and POS have established themselves as some of the major systems for electronic funds transfer and settlement facilities as well.

### **Fedwire**

The Federal Reserve Wire System, in operation since 1956, is used by the member banks for EFT and is the main funds transfer system in the USA. Presently, about 800 banks are linked together over computer-based telecommunications networks to transmit funds and statements. It is used primarily for transferring reserve account balances of depository institutions and Government securities, high-value domestic payments, bank to bank and third-party transfers and corporate-to-corporate payments made through banks.

***The inter-region funds are transferred through FEDWIRE access is made through three modes:***

- Direct access computer-to-computer connectivity for major banks.
- Direct terminal access through leased lines for online transmissions.
- Dial-up terminal facility for transmission as per requirements and needs.

### **Bankwire**

- Bankwire is the pioneer private sector electronic telecommunication network owned by an association of banks in the USA and used to transfer messages between the subscribing banks. It was originally conceived for reducing the cost of transmitting messages between participating banks.

### **Point of Sale (POS) Systems**

- The POS system allows payments to be made at the point of sales through EFT. With the advent of cards, the concept of POS has become synonymous with the EFT Point of Sales (EFTPOS).
- The system can handle not only the records of the sales, inventory level, accounting entries and related functions of the retailers but also are connected to the financial institution for effecting a transfer of funds to make payments. In POS, the retailer's terminal is directly connected to the bank's network, and the transaction can be communicated online.

### **Emergence Of Electronic Payment Systems In India**

The introduction of MICR clearing was the first step towards the process of automated settlement. The use of electronic media is one of the prerequisites for a true EFT system. Phenomenal progress has been made with the introduction of various EFT systems in the country, as described below.

Payment Service	Description	Launch Date	Operator
Electronic Funds Transfer	One to one fund transfer facility. This system has been replaced by a more efficient NEFT system for use by the general public.	1997	RBI
Real-Time Gross Settlement (RTGS)	Settlement of fund transfer orders occurs individually on a continuous and real-time basis. The minimum amount for customer transactions is ₹2 lakh. No upper limit. The RTGS system is available 24 × 7 on all days. There is a real-time transfer of funds to the beneficiary account.	2004	RBI
National Electronic Fund Transfer (NEFT)	One to one fund transfer with a half-hourly net settlement. No minimum or maximum limit. Available 24 × 7 on all days, including holidays.	November 2005	RBI
National Electronic Clearing Service (NECS)	NECS (Credit) facilitates multiple credits to beneficiary accounts with destination branches across the country against a single debit of the account of the sponsor bank.	October 2008	RBI
Credit & Debit Cards	PoS terminals, which enable customers to make payments for purchases of goods and services by means of credit/debit cards. To facilitate customer convenience, the Reserve Bank has also permitted cash withdrawal using debit cards issued by the banks at PoS terminals and ATMs.	November 2009	Banks

Payment Service	Description	Launch Date	Operator
PPIs (Cards & Wallets)	Pre-paid instruments are payment instruments that facilitate the purchase of goods and services against the value stored on these instruments. The value stored on such instruments represents the value paid for by the holders by cash, by debit to a bank account, or by credit card. The pre-paid payment instruments can be issued in the form of smart cards, magnetic stripe cards, internet accounts, internet wallets, mobile accounts, mobile wallets, paper vouchers, etc.	2009	PPI Operators
IMPS	Round the clock peer-to-peer fund transfer facility with immediate money transfer through multiple channels like Mobile, Internet, ATM, SMS, Branch and USSD.	November 2010	NPCI
NACH	Web-based solution to facilitate interbank, high volume, electronic transactions which are repetitive and periodic in nature.	2011	NPCI
Cheque Truncation System (CTS)	CTS is the process of stopping the physical movement of cheques. As per the amended Negotiable Instruments Act 1881, in cheque truncation, the movement of the physical instrument is stopped and replaced by electronic images and associated MICR line of the cheque.	February 2008	NPCI
Aadhaar-enabled Payment System	Basic banking transactions can be done at the Micro ATM of the Business Correspondent of any bank using Aadhaar authentication.	January 2016	NPCI
UPI	Peer-to-peer fund transfer facility with immediate money transfer through mobile device round the clock 24*7 and 365 days. BHIM app supports multiple bank accounts into a single mobile application. The upper limit is ₹2,00,000.	August 2016	NPCI
National Electronic Toll Collection	NPCI has developed the National Electronic Toll Collection (NETC) programme to meet the electronic tolling requirements of the Indian market. It offers an interoperable nationwide toll payment solution, including clearing house services for settlement and dispute management.	2016	NPCI
Bharat Bill Payment System	Umbrella system for payment of all bills.	July 2017	NPCI

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