

# Participant Handbook

Sector  
**Telecom**

Sub-Sector  
**Handset (Terminal Applications)**

Occupation  
**Terminal Equipment Application Dev.**

Reference ID: **TEL/Q2300, Version 1.0**  
**NSQF Level 4**



**Telecom Terminal  
Equipment  
Application Developer  
(Android)**

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**Shri Narendra Modi**  
Prime Minister of India

“ Skilling is building a better India.  
If we have to move India towards  
development then Skill Development  
should be our mission. ”



## Certificate

### COMPLIANCE TO QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS

is hereby issued by the

**TELECOM SECTOR SKILLS COUNCIL**

for

### SKILLING CONTENT: PARTICIPANT HANDBOOK

Complying to National Occupational Standards of  
Job Role/ Qualification Pack: 'Telecom Terminal Equipment Application Developer (Android)'  
QP No. 'TEL/Q2300 NSQF Level 4'

Date of Issuance: **Jun 12<sup>th</sup>, 2016**

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The preparation of this handbook would not have been possible without the Telecom industry’s support. Industry feedback has been extremely encouraging, from inception to conclusion, and it is with their input that we have tried to bridge the skill gaps existing today in the industry.

This participant handbook is dedicated to the aspiring youth who desire to achieve special skills which will be a lifelong asset for their future endeavours.

## About this Book

In the last five years, the growth of the Indian telecommunications sector has outpaced the overall economic growth. This sector is poised for strong growth of about 15% in short term during 2013–17, driven by growth in organised retail, technological advancements, changing consumer preferences and government support. With over 1 billion subscribers, India is the second largest telecom market in the world. The sector currently employs over 2.08 million employees and is slated to employ more than 4.16 million employees by 2022. This implies additional creation of 2.1 million jobs in the nine-year period.

This Participant Handbook is designed to impart theoretical and practical skill training to students for becoming an Android Application Developer in the Telecom Sector.

A Telecom Terminal Equipment Application Developer (Android) is responsible for creating Applications for Android platform that can be used on Smartphone and Tablets running on Android Operating System. He also handles end-to-end activities for application development ranging from installing requisite frameworks, setting-up of development environment, developing apps, security frameworks, testing and deployment. He must also have good programming skills in Java, multithreading and operating system concepts; problem solving & analytical skills and their translation to specified outcome and additionally expected.

This Participant Handbook is based on Telecom Terminal Equipment Application Developer (Android) Qualification Pack (TEL/Q2300) & includes the following National Occupational Standards (NOS):

1. Set-up Android framework/development environment and creating user interface - TEL/N2300
2. Developing Android VAS Application - TEL/N2301
3. Testing and Publishing Android Applications - TEL/N2302

The Key Learning Outcomes and the skills gained by the participant are defined in their respective units. Post this training, the participant will be able to set-up android frameworks; create user interfaces; develop android VAS applications; as well as test & publish android applications.

We hope that this Participant Handbook will provide a sound learning support to our young friends who want to build an attractive career in the telecom industry.

## Symbols Used



Key Learning  
Outcomes



Steps



Notes



Unit  
Objectives



Practical



Exercise

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& ENTREPRENEURSHIP



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Transforming the skill landscape

# 1. Introduction



**Telecom  
Sector  
Skill  
Council**

Unit 1.1 – Introduction to the Program

Unit 1.2 – History of Communication

Unit 1.3 – Signals

Unit 1.4 – Networks

Unit 1.5 – Channel Access Methods



## Key Learning Outcomes

**At the end of this module, you will be able to:**

1. Learn means and types of communication systems
2. Discuss how communication systems are propagated from one place to another
3. Understand the networking of communication systems and Internet
4. List access methods which help the data to flow
5. Describe the different generations of advanced communication systems

# UNIT 1.1: Introduction to the Program

## Unit Objectives

At the end of this unit, you will be able to:

- 1. Learn the basics of Telecommunication and its working

### 1.1.1 Introduction

Telecommunication is defined as the transmission of signals through physical media or through radiations. The signals can be text, images, sounds or information. The physical media used for transmitting the signals can be wires, optical fibres and the radiation media used can be electromagnetic systems.

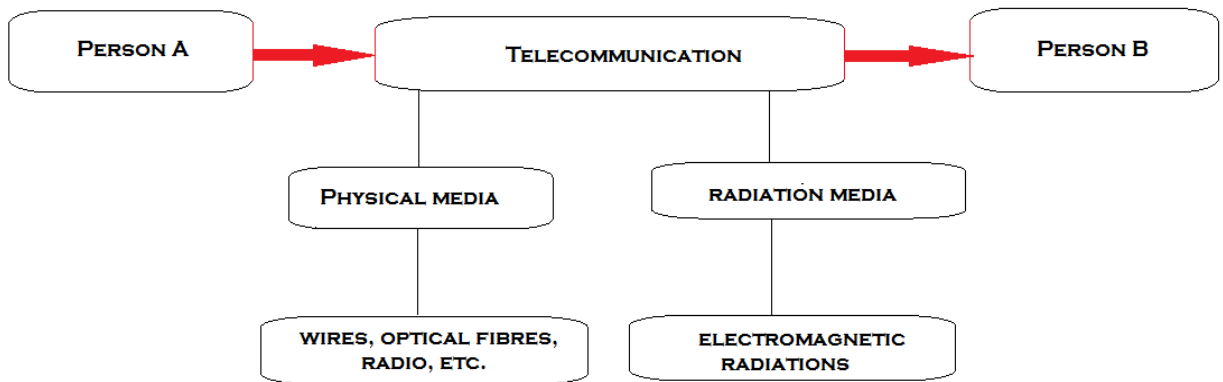


Fig. 1.1.1 Telecommunication process

The above diagram shows how a telecommunication system can be generated between two persons who may be living in two different places.

## Notes

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## UNIT 1.2: History of Communication

### Unit Objectives

At the end of this unit, you will be able to:

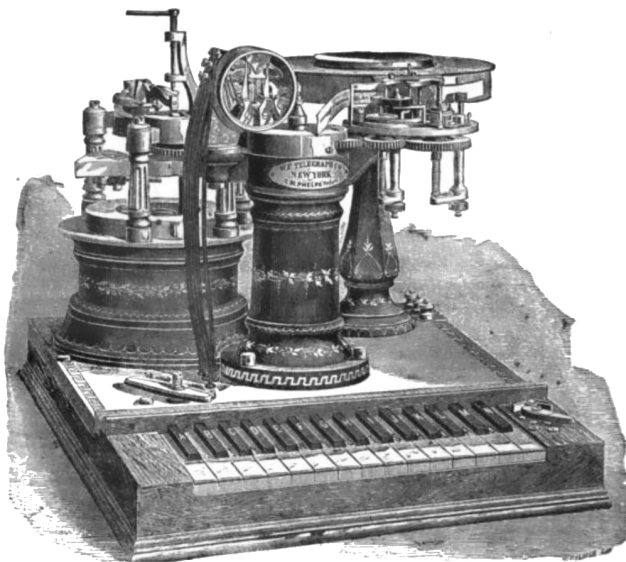
1. Learn about various types of communication systems
2. Understand the working of the Internet

### 1.2.1 History of Communication

- Communication was thought to have started very early when civilizations were set up.
- Persians were said to have the most efficient means of postal services as early as 540 B.C.
- Around the 11th century, domesticated pigeons were used to deliver messages.

### 1.2.2 Telegraph and Telephone

- The electric telegraph was invented in 1816 by English inventor Francis Ronalds using static electricity.
- After the invention of telegraph many notable scientist made their version with some advancements.



*Fig. 1.2.1 A Telegraph and Telephone*

- In 1876, telephone was invented by Alexander Bell and Alisha Gray.
- The invention of telephone gave birth to the invention of cell phones and mobile phones in the early 18th and 19th centuries.



Fig. 1.2.2 Traditional telephone, (b) Evolution of cell phones over time



Fig. 1.2.3 Evolution of cell phones over time

### 1.2.3 Computers and the Internet

- Computers are the devices that are used for doing random arithmetic calculations automatically.
- Computers were made to setup networks all across the world through data packet transfer wirelessly with the help of optical fibres that were buried underground.
- The configurations that were set with the help of computers were made to communicate using packet switching and the data would be sent to different computers using a centralized mainframe computer.
- Communication through internet has played a very important role.
- E-mails, documents, videos, songs, etc. can be easily transformed into signal with the help of a computer and then transferred through the internet to the other computer.

A telecommunication system comprises of three fundamental parts (Refer Fig 1.1.4):-

- Transmitter
- Transmission medium
- Receiver

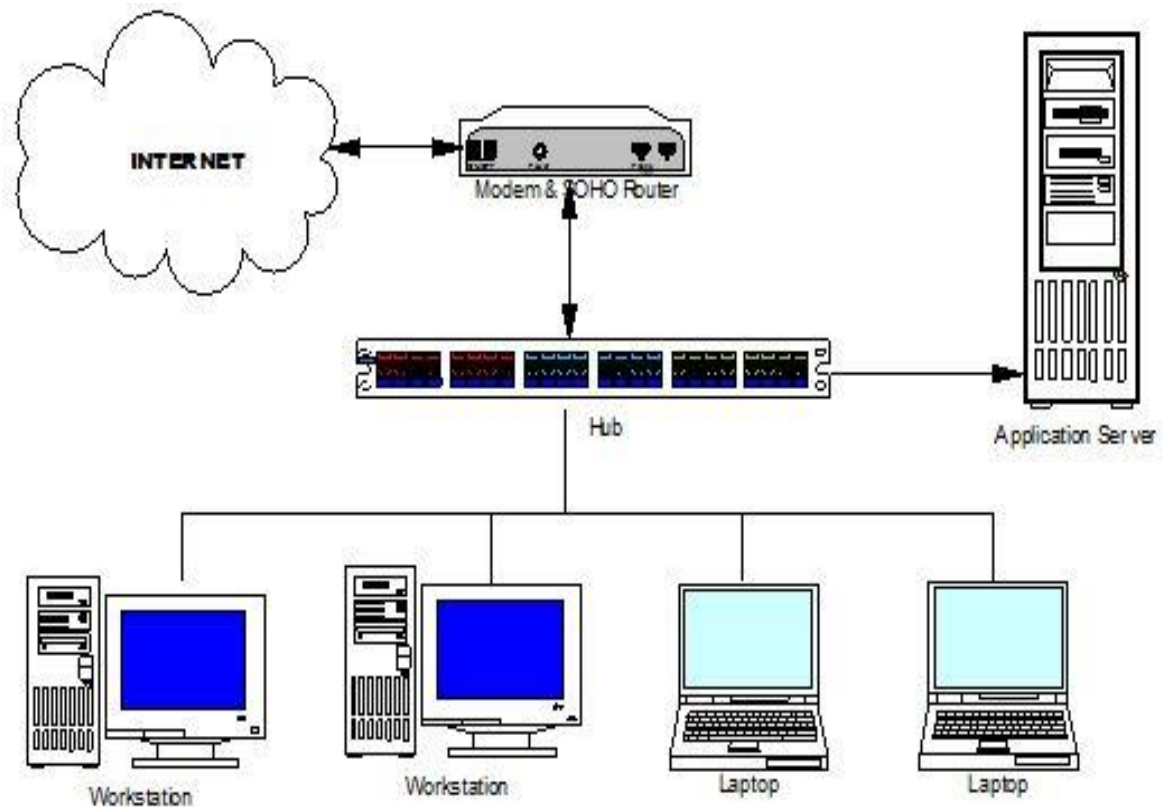


Fig. 1.2.4 A typical diagrammatic representation showing the working process of internet with the help of the labeled devices

The work of a transmitter is to convert the information that has to be sent, into a signal.

The transmission medium can be a wire, optical fibre or electromagnetic radiation.

Receiver that is on the other end receives the signal and then converts it into useful information for the user on the other end.

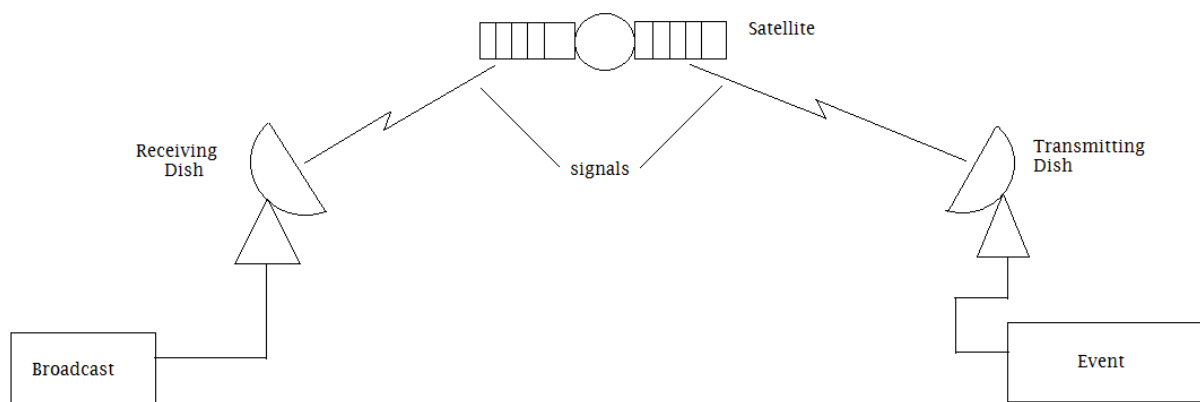


Fig. 1.2.5 Point-to-point communication since we have only one transmitter and one receiver. Now, if there are multiple transmitters and multiple receivers, we call those systems as multiplex systems



## UNIT 1.3: Signals

### Unit Objectives

At the end of this unit, you will be able to:

1. Understand signals or the data carriers

### 1.3.1 Signals

- Signals play a very important role in a telecommunication system since they carry the information.
- The signals are transformed into, either an analog signal or a digital signal (refer Fig 1.3.1).
- An analog signal can be defined as the signal which changes with respect to the information.
- A digital signal is that type of signal which carries information in binary form (in combinations of 0s and 1s).

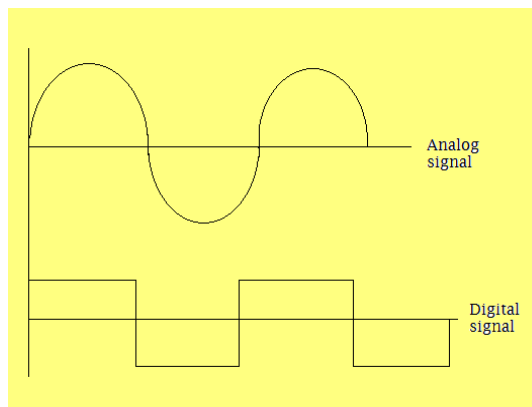


Fig. 1.3.1 Types of signals

- The transmitted signal does not have a 100% efficiency and energy because the signals are degraded by undesirable physical noise.
- Noise can be defined as adding or subtracting energy from the signal in a random manner.

### Notes

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## UNIT 1.4: Networks

### Unit Objectives

**At the end of this unit, you will be able to:**

1. Understand the basics of networking
2. Learn about generations of networks

### 1.4.1 Networks

- The mutual working of transmitters and receivers over large distances is termed as telecommunication networks.
- To transmit information from one place to another in a digital communication system, a controlling unit called a router is used.
- In analogue systems, switches are used between two or more users.
- The signal loses energy as it moves over large distances.
- To strengthen the signal, amplification is required.
- Amplification is achieved by use of physical systems called repeaters.

### 1.4.2 Mobile Telecommunication

- The mobile phone services started with the zero generation (0G) services which only supported few calls.
- Further advancements brought 1G, 2G, 3G and 4G services respectively.
- A mobile phone has some basic components which are stated as under:
  1. **Battery**  
The battery is nothing but a power source in a mobile phone which helps the phone to function.
  2. **Input**  
The input to the phone is the keypad and touch screens as used in smart phones. The input to the phone helps a user to interact with the function of the phone.
  3. **SIM card**  
SIM stands for “Subscriber Identity Module”. The function of the SIM card is to provide network services like making phone calls and sending text messages.
  4. **Memory Card**  
The latest mobile phone devices are equipped with slots for external memory called a memory card. The function of the memory card is to store data of the mobile phone like images, songs, videos etc. As the mobile phones were evolved, standards were set for the mobile communication. These standards are also called as generations. We will now discuss in detail, the different generations of mobile communication.

### 1.4.3 The 3rd Generation Partnership Project (3GPP)

The 3GPP is a collaboration between the organisational partners who belong to Asia, Europe and North America. Following are the generations of mobile communication that come under 3GPP:

#### 1. GSM (2nd Generation)

- It was developed by European Telecommunications Standards Institute in 1991 in Finland.
- It is the default global standard as of now.
- GSM at first used circuit-switched transport for packet data transfer.
- Services called General Packet Radio Service or GPRS and Enhanced Data rates for GSM Evolution or EDGE were used for better data transfer.

#### 2. UMTS (3rd Generation)

- 3GPP introduced the 3rd generation (3G) services for better voice quality and enhanced data transferring speeds.
- It was named as The Universal Mobile Telecommunication System or UMTS.
- It uses wideband Code Division Multiple Access (W-CDMA) radio access technology for better efficiency of mobile operators.
- UMTS supports maximum data transfer rates via High Speed Packet Access (HSPA).

#### 3. HSPA

- High Speed Packet Access or HSPA is a combination of High Speed Downlink Packet Access (HSDPA) and High Speed Uplink Packet Access (HSUPA).
- HSPA was introduced to improve the efficiency and performance of the 3rd Generation mobile Communication networks.

#### 4. LTE (4th Generation)

- Long-Term Evolution or LTE is a standard under 3GPP.
- It was developed for high speed wireless mobile communication and data transfer.
- LTE together with EDGE and UMTS/HSPA makes the 4th generation (4G) technology.

### Notes



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## UNIT 1.5: Networks

### Unit Objectives

At the end of this unit, you will be able to:

1. Learn about multiplexing
2. Understand the basics of code division multiple access systems

### 1.5.1 Channel Access Methods

#### Multiplexing

- Multiplexing is a method by which multiple signals are converted into one signal over a shared medium.
- In a multiplexed signal the communication channel is divided into many logical channels.
- The data or messages that these logical channels carry is integrated into a single channel and then converted into the original signal at the receiver's end.
- The device which helps in the multiplexing is called a Multiplexer or MUX (Refer Fig 1.5.1).
- The device which helps in demultiplexing is called as a demultiplexer or a DEMUX (Refer Fig 1.5.1).

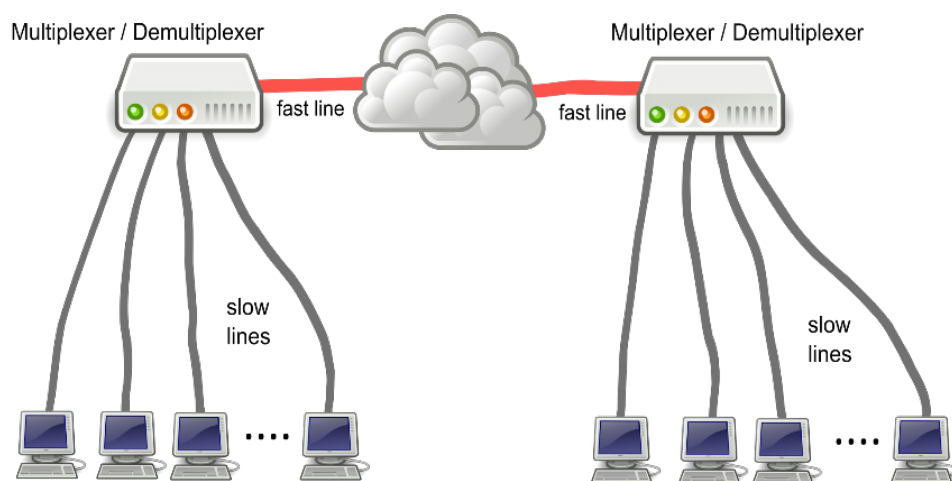


Fig. 1.5.1 Multiplexing/ De-multiplexing systems

- The channel access scheme is based on the multiplexing method.
- Multiplexing helps the data or signals to travel throughout the same physical medium which is a channel.
- One of the fundamental channel access schemes is called the Code Division Multiple Access or CDMA scheme.
- CDMA scheme has a wider radio spectrum which helps in transferring the data and signals simultaneously over the same carrier frequency.