

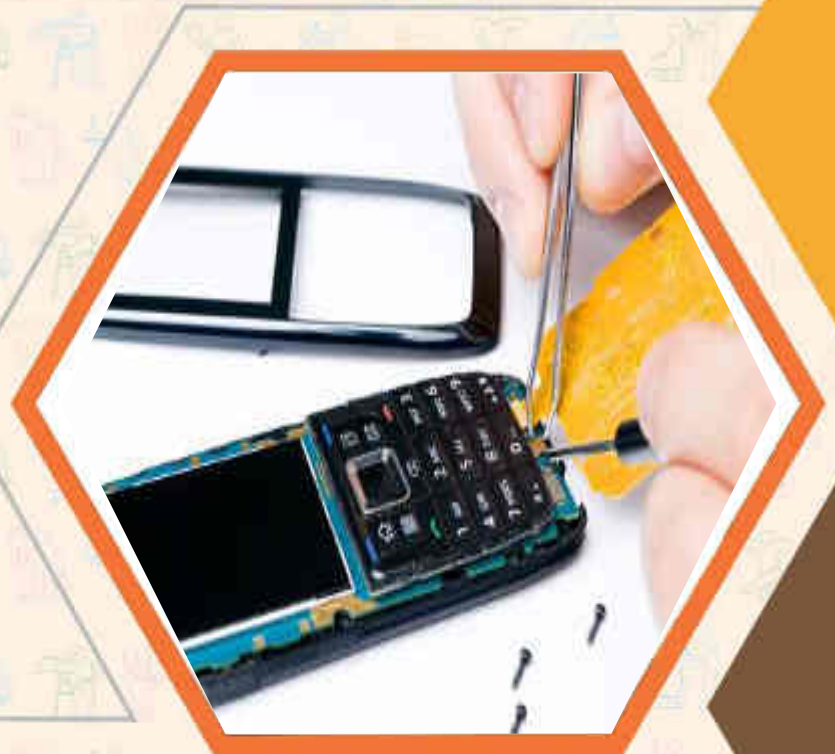
Participant Handbook

Sector
Telecom

Sub-Sector
Handset

Occupation
Customer Service

Reference ID: TEL/Q2201, Version 1.0
NSQF Level 4



**Handset Repair Engineer
(Level II)**

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Telecom Sector Skill Council
2nd Floor, Plot No 105, Sector 44
Gurgaon – 122003, Haryana
Email: tssc@tsscindia.com
Phone: +91 124 4148029

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

Shri Narendra Modi
Prime Minister of India



Certificate

COMPLIANCE TO QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS

is hereby issued by the

TELECOM SECTOR SKILL COUNCIL

for

SKILLING CONTENT : PARTICIPANT HANDBOOK

Complying to National Occupational Standards of
Job Role/ Qualification Pack: 'Handset Repair Engineer (Level II)'
QP No. 'TEL/Q2201 NSQ Level 4'

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The preparation of this manual 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 manual 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 percent in short term during 2013–17, driven by growth in organised retail, technological advancements, changing consumer preferences and government support. With over 1000 million 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 book is designed to impart theoretical and practical skill training to students for becoming a Handset Repair Engineer (Level II).

Individuals at this job are responsible for repairing a handset both hardware and software components, testing the handset after repairs for adequacy and ensuring availability of adequate inventory of the hardware components.

This Trainee Manual is based on Handset Repair Engineer (Level II) Qualification Pack (TEL/Q2201) & includes the following National Occupational Standards (NOSs):

1. Perform handset repair – hardware
2. Perform handset repair – software
3. Perform tablet repair – hardware and software

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 repair hardware and software components of a handset and also test it for adequacy of repair.

We hope that this Trainee Manual will provide a sound learning support to our young friends to build an attractive career in the telecom industry.

Symbols Used



Key Learning
Outcomes



Steps



Exercise



Tips



Notes



Unit
Objectives

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1. Introduction

Unit 1.1 – About the telecom industry

Unit 1.2 – About cell phones

Key Learning Outcomes

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

1. Outline the telecom market in the country and some mobile phone vendors
2. Explain about the evolution of cell phones
3. Explain and outline how mobile communication and cell phones work
4. Explain and outline the role of a handset repair engineer

UNIT 1.1: About the Telecom Industry

Unit Objectives

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

1. Explain and outline the growth and opportunities in the Indian telecom industry
2. List some popular mobile phone vendors in the country
3. Explain and outline the role of a handset repair engineer

1.1.1 Telecom Industry at a Glance

India today is the second fastest growing economy of the world. The economic reforms over the last three decades has led to liberalisation of the Indian economy and its closer integration to the world economy. This has led to a paradigm change in the Indian economy from being a closed, centralized economic model to a market-oriented model. The improved business climate has resulted in the emergence of India as an economic power house.

Indian telecom is on a tremendous growth path. In terms of socioeconomic development, connecting a diverse and thriving economy of over a billion people with the rest of the world is an unparalleled achievement.



Fig. 1.1.1: A common sight in India today

1.1.1 Telecom Industry at a Glance (Continued)

The transformation of the Indian telecom industry from a monopoly to a decentralised competitive model has been challenging. The National Telecom Policy (NTP) of 1994 with its aim of "telephone on demand", making all leading class services available at a reasonable price, transforming India into a major manufacturing and export hub for telecom equipment and provision of basic telephony services to all villages marked the first steps toward this new model.

The revised NTP was issued by the Government of India in 1999. This policy has had a major role in reshaping the sector by overhauling the policy structure as it existed till then. India achieved the set targets and goals well ahead of schedule and is a thriving market today.

India can today boast of over 1103 million subscribers and overall tele-density in excess of 86 per cent.

The true potential of the telecom sector is only now being unleashed with the large number of GOI initiatives to make the Indian society more inclusive. A robust policy framework is necessary to exploit the full potential of the telecom sector in the country's progress.

1.1.2 A Few Handset Vendors in India

Samsung India Electronics is a leading provider of Consumer Electronics, IT and Telecom products in the Indian market. Three research labs and two manufacturing plants in the country drives innovation in the company. It has a large employee base.



The company has also focussed on capability building and skilling of its workforce by having a modern training facility with in its manufacturing premises . The Media Solutions Centre division of the company is its prime teaching facility offering interactive study material through its Smart Learning solution.

1.1.2 A Few Handset Vendors in India (Continued)

The facilities on offer aim to supplement the knowledge gained by millions of students in formal classes in CBSE board and also those targeting competitive examinations. Samsung has plans to extend similar solutions to other boards in the country, higher education as also develop skill content.

Micromax Informatics Limited is a leading consumer electronics company in India. It is also one of the major manufacturers of mobile handsets. It has revolutionized the mobile space in India being the first to bring in cost effective devices and technology into the Indian markets and thus enabling absorption of technology at a large scale



Micromax is currently one of the top smartphone company in India with a manufacturing facility in Hyderabad with a capacity to manufacture one million mobile phone devices per month.

LAVA International Ltd is another leading player in the mobile handsets space. The company has made a mark for itself in a short time-frame and has an innovative policy that endeavours to make a niche space for itself across the spectrum that includes every field namely Product, After-Sales Service and Distribution. Being one of the key players in the Indian handset manufacturing industry, Lava stands to greatly benefit from the Make in India campaign. The company plans to invest Rs. 1200 crores in phases in its Noida plant so as to gradually increase the production up to 10 million phones in a month which will help in generating employment for 1 lakh people.



Intex Technologies (India) Ltd., is another player in consumer durables, IT accessories and handsets. The mobile business has been a key driver of growth. Its forays into international business began with its forays into Nepal by marketing its mobile phones there. The company now has an established presence in the Middle-East, ASEAN, SAARC region as also number of African nations.



1.1.2 A Few Handset Vendors in India (Continued)

The company has set up its R&D facilities in India and China. The facility caters for product design and development needs of the company. It employs a highly skilled and experienced workforce and has all modern equipments and facilities necessary for such a complex and high ended job. The company presently operates four modern facilities at Jammu, Himachal Pradesh (Baddi) and Uttar Pradesh (NOIDA) manufacturing diverse products. A large ultra modern manufacturing facility is coming up in Greater Noida. The company aims to have a world class manufacturing facility there that would cater for its national as also international clients. It gives employment to over 14000 people all over the country and has established its presence pan-India by having a large marketing and maintenance network comprising stock and sales offices and a large No of service touch points. Intex is an ISO 9001:2008 certified company.

Celkon Mobiles is another leading telecom company in India into handset manufacturing. It introduced mobile phone solutions as also wireless technologies in India.



It has attempted to establish its USP to be providing personalised service to all its customers and manufacture customized phones with a host of features for its users. It has an all India presence with over 800 service centres and a repair center in Hyderabad, Banglore & Delhi. The company's business plans include setting up an R&D and design house and today is one of the major domestic employers within the country.

Karbons Mobiles started its operations in 2009. It aims to bring smartphone technologies to the masses. It is a joint venture of the Jaina Group and UTL Group based based at Delhi and Banglore repectively. Karbons offers a large variety of devices that meet his customer needs.



With over 90 percent penetration, Karbons has its presence all over the country. It also plans to expand and makes its presence beyond the country in countries of the Middle East, Africa, CIS, Eastern Europe, South Asia and South East Asia. To ensure effective after sales service, the company has a chain of service and maintenance centres across India as also 12 international centres in different countries.

1.1.3 Handset Repair Engineer

With the growth in Indian Telecom industry the demand for various professionals such as Handset Repair Engineer, Telecom Engineer, etc., is bound to increase. Over the next five years this sector has an overall potential to create in excess of 40 lakh direct and indirect jobs.

Job description: The handset repair engineer is expected to repair a faulty handset irrespective of the fault being in the handset's software or hardware. The first step for a handset repair engineer is to carefully listen to and understand the customer's description of the problem. Then he is required to run test diagnostics and assess functionality of the device before opening it up. Components that may require replacement like antenna, battery, LCD screens, keypads, buttons and camera would require examination. Skillfulness and maintaining a clean, static-free work environment is a pre-requisite for the job.

Basic written and communication skills, clear eyesight and strong reading and analytical abilities are essential qualities in a handset repair engineer. The individual is expected to be analytical and capable of handling high pressure situations to fulfill his assigned responsibilities.

KRAs Handset Repair Engineer:

- Performing efficient, high quality diagnosis and repairs.
- Actively maintain and update knowledge on the subject.
- Perform tasks associated with workshop operations.
- Maintain service record details.

UNIT 1.2: About Cell Phones

Unit Objectives

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

1. List and outline the changes in technology of a cell phone over the years
2. Explain and outline how a mobile phone work over a network
3. Explain what goes on inside the handset during mobile communication
4. List and explain common features and uses of mobile phone
5. List and explain some popular mobile phone platforms

1.2.1 Evolution of the Cell Phone

Year	Event
1983	Motorola releases the first consumer-available cell phone – DynaTAC.
1989	Motorola releases the MicroTAC, which later becomes the inspiration for the first flip phone.
1993	IBM and BellSouth release the first mobile phone to feature PDA capabilities.
1996	Motorola upgrades the MicroTAC to StarTac, a genuine flip that operated on GSM networks
1998	Nokia releases the first candybar phone. It is lightweight and features a rechargeable battery.
1999	RIM releases the first Blackberry as a two-way pager. It hosts PDA functions but still lacks mobile connectivity.
2000	Ericsson introduces the first Bluetooth phone. It allow consumers to wirelessly connect their phones to their computers.
2002	Research in Motion (RIM) upgrades their Blackberry PDAs into Blackberry smartphones.
2004	Style is finally incorporated into cell phones, courtesy the Motorola Razr, an elegant phone only 14-mm thick.
2007	The Apple iPhone 1.0 revolutionises the cellular industry via a multi-touch display and a full-fledge operating system.
2012	The iPhone is on its 5 th generation and 4G technology is on the rise.

Table 1.2.1: A timeline of mobile handset development

1.2.2 How Cell Phones Work?

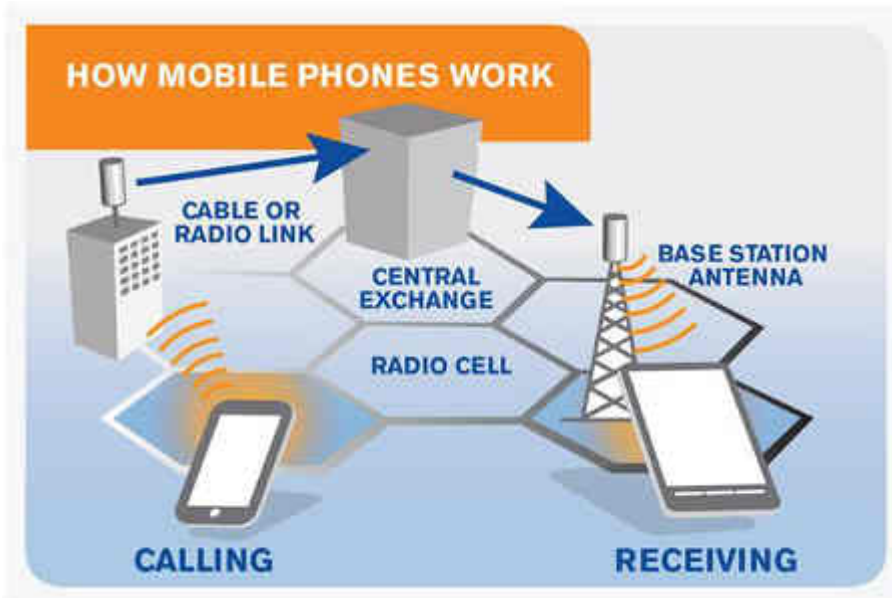


Fig. 1.2.1: Mobile communication at work

Fig 1.2.1 depicts the basic working principle of a mobile phone. When we make a call to another number, our voice is converted into an electrical signal by the phone and then transmitted as radio waves. On receiving this electrical energy, the receiving mobile converts it back into sound.

Mobile phones are required to be very compact for ease of carriage. They therefore are designed to use minimum power and have compact antennas. This means that a mobile phone has very limited range. To increase range, the entire coverage area is divided into a group of hexagonal 'cells' –with its own large antenna and transmitting equipment or base station fixed on ground. These cell antenna pick up signal from our phone and send it onwards to the nearest cell from the call recipient. While on the move, the call is switched from cell to cell without any interruption.

One major advantage of such a small cell structure is that frequencies can be re-used beyond the adjacent cells. This is important due to limited availability of frequencies. The cell size depends on factors like user density and power of the transmitting base station.

You must have noticed bars on top of your phone that keep changing in numbers. More bars mean a stronger signal and is a measure of the magnitude of the signal received from the cell tower. The magnitude of the received signal is called "signal strength". Poor signal strength indicates either your signal is being blocked by some obstruction like a building or the cell tower you are connected to is far away. In case of poor signal strength, a cell phone transmits a stronger signal so as to connect to the tower, consuming greater power thus draining the battery faster.

1.2.2 How Cell Phones Work? (Continued)

Frequency-Division Multiple Access (FDMA), Time-Division Multiple Access (TDMA) and Code-Division Multiple Access (CDMA) are the three technologies used in mobile communications

FDMA puts each call on a separate frequency. It is used mainly in analog systems and is not in much use now due to inherent limitations.

TDMA is used in the global communication system for mobile communication (GSM). In this access system, a cell is assigned a certain portion of time on a specified frequency by a process called "Sampling". Voice data is compressed to digital information at the cell and is more efficient than FDMA system.

CDMA is a truly digital access technique. It gives a unique code to each call and using "Spread Spectrum" technology spreads it over the available frequencies. Each phone transmits on all allotted frequencies and uses the global positioning system (GPS) to get positional information.



Fig. 1.2.2: A telecom tower

1.2.3 Common Features of Mobile Phone



Fig. 1.2.2: Common features of a cell phone

1.2.3 Common Features of Mobile Phone (Continued)

Voice: Refers to the phone calls that we make to other cell phones and the calls we receive on our handset.

SMS: Abbreviation for short message service. SMS is the transmission of short text messages to and from a mobile phone or other similar devices. Messages must be no longer than 160 alpha-numeric characters and contain no images or graphics.



Fig. 1.2.3: Popular applications of a smartphone

USSD (Unstructured Supplementary Service Data). This is a communication technology used in the global system for mobile (GSM) system. It is used to send text between a mobile phone and an application program in the network. Prepaid roaming or mobile chatting are typical examples.

Internet: The Internet is a global network connecting millions of computers across the globe capable of exchanging data.

Email (electronic mail): The transmission of messages from one device to another (one or more recipients) by electronic means over a communications network is called Email.

Camera: Used to take pictures or shoot videos. The camera is now increasingly used by other mobile applications such as QR Reader, Bar Code Reader, etc.

Wallet: A means to provide credit or debit card information on your mobile in digital form. You can then make a payment electronically using an application on your handset.

Alarm Clock: As the name suggests, this app help sets alarms that ring at specific time for you.