

# COLLEGE OF SCIENCE AND TECHNOLOGY RINCHENDING – PHUENTSHOLING

## STUDENT'S WEEKLY DIARY FOR “ON THE JOB TRAINING”

(This report is to be submitted to Department at the end of OJT attachment)

### DAILY DIARY FOR WEEK I (20/12/23 - 22/12/23)

Name of Student:- Sonam Phuntsho \_\_\_\_\_ Roll No. : 02200165 \_\_\_\_\_ Trade: BE IT \_\_\_\_\_

Address during OJT: Town, Paro \_\_\_\_\_

Name of Organization: Bhutan Telecom Limited \_\_\_\_\_

Name/Type of Work Carried Out During the Week:- Network Exploration and Field Operations

Name of immediate Officer : \_\_\_\_\_

Designation:- \_\_\_\_\_

Day & Date	Time of Going to Work	Time of Leaving	Hours Spent on the day	Describe the type of work you have carried out.
Wednesday	9:00 a.m.	5:00 p.m.	8 Hours	<u>First Day at Bhutan Telecom: Paro District Network Exploration</u> <ul style="list-style-type: none"> <li>● Explored Bhutan's mesh network, connecting Gelephu, Phuntsholing, and Thimphu for redundancy.</li> <li>● Checked out how CR1 sends data to Paro's POPs, each acting as a local gateway.</li> <li>● Noticed a shift from Nokia, Ericsson, and Ceragon to Cisco gear.</li> <li>● Explored how bandwidth is divided among POPs for efficient distribution.</li> </ul>
Thursday	-	-	-	On Leave (Headache)
Friday	9:00 a.m.	5:00 p.m.	8 Hours	<u>Field Work – Power Cable Replacement at Telecom Site</u> <ul style="list-style-type: none"> <li>● Engaged in hands-on field operations to enhance the power infrastructure of a pivotal Telecom site.</li> <li>● Initiated the replacement of outdated 3-phase power cables with advanced 4-phase cables</li> <li>● The groundwork involved extensive digging to prepare for the subsequent laying of the cable</li> <li>● The day concluded with the cable replacement task remaining incomplete</li> </ul>

**Total Hours Spent in Training Per Week:- 16 Hours**

1. I hereby certify that the above entries made are correct to the best of my knowledge

Sonam Phuntsho

**(Name and Signature of student)**

2. Certified that the information furnished are correct and have been verified by me.

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**(Signature of the Immediate Supervisor)**  
**Seal of the Organization**

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## STUDENT'S WEEKLY DIARY FOR “ON THE JOB TRAINING”

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### DAILY DIARY FOR WEEK II (25/12/23 - 29/12/23)

Name of Student:- Sonam Phuntsho \_\_\_\_\_ Roll No. : 02200165 \_\_\_\_\_ Trade: BE IT \_\_\_\_\_

Address during OJT: Town, Paro \_\_\_\_\_

Name of Organization: Bhutan Telecom Limited \_\_\_\_\_

Name/Type of Work Carried Out During the Week: Infrastructure Upgrade and Network Enhancement

Name of immediate Officer : \_\_\_\_\_

Designation:- \_\_\_\_\_

Day & Date	Time of Going to Work	Time of Leaving	Hours Spent on the day	Describe the type of work you have carried out.
Monday	9:00 a.m.	5:00 p.m.	8 Hours	<u>Power Cable Replacement Continuation - Channel Completion</u> <ul style="list-style-type: none"> <li>Progressed with the crucial task initiated on last week, focusing on upgrading the power infrastructure.</li> <li>Successfully completed the excavation of the channel for the power cable.</li> </ul>
Tuesday	9:00 a.m.	5:00 p.m.	8 Hours	<u>Power Cable Replacement Completion</u> <ul style="list-style-type: none"> <li>Cut and laid the power cable in the excavated channel, completing the replacement phase.</li> <li>Implemented safety measures with warning tapes and utilized soft soil for cable protection.</li> <li>Executed our end's connection, leaving the final link to the main power line to BPC.</li> <li>Successfully concluded the power cable replacement</li> </ul>
Wednesday	9:00 a.m.	5:00 p.m.	8 Hours	<u>Optic Fibre Cable Installation</u> <ul style="list-style-type: none"> <li>Dedicated the day to laying out fibre optic cables, catering to customer services such as broadband, fixed line, and leased line connections.</li> <li>Explored optimal paths for cable laying, occasionally sharing poles with the power corporation, highlighting the collaborative efforts in infrastructure support.</li> <li>Deployed specialized equipment to secure cables in place, preventing excessive swinging during adverse weather conditions.</li> </ul>
Thursday	9:00 a.m.	5:00 p.m.	8 Hours	<u>Generator Cable Replacement and Electric Pole Installation</u> <ul style="list-style-type: none"> <li>Shifted focus to Satsam, replacing the cable, this time dedicated to the generator system.</li> </ul>

				<ul style="list-style-type: none"> <li>● Constructed a customized electric pole by connecting various-sized joints, a crucial component for cable infrastructure.</li> <li>● Installed the pole and routed cables from the power supply to the pole, then extending from the pole to the ground and finally reaching the generator underground.</li> </ul>
Friday	9:00 a.m.	5:00 p.m.	8 Hours	<u>Network Enhancement</u> <ul style="list-style-type: none"> <li>● Addressed issues at Bondey, replacing the faulty Nokia FBRB for improved fixed broadband services.</li> <li>● Installed Ericsson RRU for enhanced network performance in a compact, resilient design.</li> </ul>

**Total Hours Spent in Training Per Week:- 40 Hours**

1. I hereby certify that the above entries made are correct to the best of my knowledge

Sonam Phuntsho

**(Name and Signature of student)**

2. Certified that the information furnished are correct and have been verified by me.

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**(Signature of the Immediate Supervisor)**  
**Seal of the Organization**

# COLLEGE OF SCIENCE AND TECHNOLOGY RINCHENDING – PHUENTSHOLING

## STUDENT'S WEEKLY DIARY FOR “ON THE JOB TRAINING”

(This report is to be submitted to Department at the end of OJT attachment)

### DAILY DIARY FOR WEEK III (01/01/24 - 05/01/24)

Name of Student:- Sonam Phuntsho \_\_\_\_\_ Roll No. : 02200165 \_\_\_\_\_ Trade: BE IT \_\_\_\_\_

Address during OJT: Town, Paro \_\_\_\_\_

Name of Organization: Bhutan Telecom Limited \_\_\_\_\_

Name/Type of Work Carried Out During the Week: Network Devices and Mobile Network Insight

Name of immediate Officer : \_\_\_\_\_

Designation:- \_\_\_\_\_

Day & Date	Time of Going to Work	Time of Leaving	Hours Spent on the day	Describe the type of work you have carried out.
Monday	9:00 a.m.	5:00 p.m.	8 Hours	<u>Exploration of Network Devices and OSI Model</u> <ul style="list-style-type: none"> <li>● Explored hosts and IP addresses, understanding their roles in network communication.</li> <li>● Explored networking components like hubs, bridges, repeaters, switches, and routers, grasping their significance in network architecture.</li> <li>● Delved into the OSI model, comprehending its seven layers and functions.</li> </ul>
Tuesday	-	-	-	Nyilo Holiday
Wednesday	9:00 a.m.	5:00 p.m.	8 Hours	<u>Insight into Mobile Network Generations and Tariff</u> <ul style="list-style-type: none"> <li>● Explored mobile network generations (2G, 3G, 4G, VoLTE, 5G), understanding their architectures and technological evolution (Overview)</li> <li>● Examined voice and data pricing</li> </ul>
Thursday	9:00 a.m.	5:00 p.m.	8 Hours	<u>Cisco Packet Tracer Learning and Network Building Practice</u> <ul style="list-style-type: none"> <li>● Completed a brief online course on Cisco Packet Tracer, a network simulation tool.</li> <li>● Applied the acquired skills by practising network building using Cisco Packet Tracer.</li> </ul>
Friday	9:00 a.m.	5:00 p.m.	8 Hours	<u>Grasping Network Fundamentals</u> <ul style="list-style-type: none"> <li>● Explored diverse network types, understanding architectures and functions.</li> <li>● Explored data transmission intricacies and fundamental concepts like bandwidth and throughput</li> </ul>

				<ul style="list-style-type: none"> <li>● Distinguished client and server roles, identified crucial network components, and examined ISP connectivity options</li> <li>● Delved into wireless network principles and explored configuring mobile devices for seamless integration.</li> </ul>
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**Total Hours Spent in Training Per Week:- 32 Hours**

1. I hereby certify that the above entries made are correct to the best of my knowledge

Sonam Phuntsho

**(Name and Signature of student)**

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# COLLEGE OF SCIENCE AND TECHNOLOGY RINCHENDING – PHUENTSHOLING

## STUDENT'S WEEKLY DIARY FOR “ON THE JOB TRAINING”

(This report is to be submitted to Department at the end of OJT attachment)

### DAILY DIARY FOR WEEK IV (08/01/24 - 12/01/24)

Name of Student:- Sonam Phuntsho \_\_\_\_\_ Roll No. : 02200165 \_\_\_\_\_ Trade: BE IT \_\_\_\_\_

Address during OJT: Town, Paro \_\_\_\_\_

Name of Organization: Bhutan Telecom Limited \_\_\_\_\_

Name/Type of Work Carried Out During the Week:- Protocols, Subnetting, and GSM Evolution

Name of immediate Officer : \_\_\_\_\_

Designation:- \_\_\_\_\_

Day & Date	Time of Going to Work	Time of Leaving	Hours Spent on the day	Describe the type of work you have carried out.
Monday	9:00 a.m.	5:00 p.m.	8 Hours	<u>Continuing Network Fundamentals</u> <ul style="list-style-type: none"> <li>● Explored communication protocols and standards, recognizing their essential role in seamless data exchange.</li> <li>● Explored network communication models, gaining insights into their structures.</li> <li>● Delved into the OSI model, comprehending distinct functions in network communication at each layer.</li> <li>● Explored diverse network media types and their significance in data transmission.</li> </ul>
Tuesday	-	-	-	Voting Day
Wednesday	9:00 a.m.	5:00 p.m.	8 Hours	<u>Logical Addressing and Subnetting</u> <ul style="list-style-type: none"> <li>● Explored IPv4 addressing, understanding its structure and significance.</li> <li>● Explored classful addressing, distinguishing between Class A, B, and C addresses.</li> <li>● Gained insights into IPv4 communication types: unicast, multicast, and broadcast.</li> <li>● Differentiated between public and private IPv4 addresses.</li> <li>● Explored classless addressing for more flexible IP allocation.</li> <li>● Learned subnetting techniques, including FLSM and VLSM</li> </ul>
Thursday	9:00 a.m.	5:00 p.m.	8 Hours	<u>Comprehensive Exploration of Network Evolution Starting with GSM</u> <ul style="list-style-type: none"> <li>● Studied circuit-switched data</li> </ul>

				transmission, foundational in GSM networks <ul style="list-style-type: none"> <li>● Explored GSM standards for interoperability</li> <li>● Examined transmission speeds in GSM networks</li> <li>● Explored the critical role of SS7 in GSM networks for signaling and control</li> <li>● Gained insights into GSM subsystems and their roles</li> <li>● Explored the architecture and functionalities of the GSM network subsystem</li> </ul>
Friday	-	-	-	Traditional Day of Offering

**Total Hours Spent in Training Per Week:- 24 Hours**

1. I hereby certify that the above entries made are correct to the best of my knowledge

Sonam Phuntsho

**(Name and Signature of student)**

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# COLLEGE OF SCIENCE AND TECHNOLOGY RINCHENDING – PHUENTSHOLING

## STUDENT'S WEEKLY DIARY FOR “ON THE JOB TRAINING”

(This report is to be submitted to Department at the end of OJT attachment)

### DAILY DIARY FOR WEEK V (15/01/24 - 19/01/24)

Name of Student:- Sonam Phuntsho \_\_\_\_\_ Roll No. : 02200165 \_\_\_\_\_ Trade: BE IT \_\_\_\_\_

Address during OJT: Town, Paro \_\_\_\_\_

Name of Organization: Bhutan Telecom Limited \_\_\_\_\_

Name/Type of Work Carried Out During the Week:- Wireless Networks & Security

Name of immediate Officer : \_\_\_\_\_

Designation:- \_\_\_\_\_

Day & Date	Time of Going to Work	Time of Leaving	Hours Spent on the day	Describe the type of work you have carried out.
Monday	9:00 a.m.	5:00 p.m.	8 Hours	<u>Continuing GSM Exploration</u> <ul style="list-style-type: none"> <li>● Explored the BSS role in voice processing in GSM networks</li> <li>● Studied mobility management and call control for seamless communication.</li> <li>● Examined the mobile device functionalities in GSM for user communication</li> <li>● Explored the role of SIM cards in authentication and network access</li> <li>● Investigated the Intelligent Network Subsystem, focusing on CAMEL for advanced services</li> </ul>
Tuesday	9:00 a.m.	5:00 p.m.	8 Hours	<u>Installation of Security Cameras</u> <ul style="list-style-type: none"> <li>● Installed security cameras at multiple sites to protect crucial equipment, particularly batteries</li> <li>● Developed hands-on expertise in crafting Ethernet cable connectors, mastering both straight-through and crossover configurations.</li> <li>● Learned Power over Ethernet (PoE) concepts, understanding how cameras draw power and data through a single cable.</li> <li>● Acquired insights into the configuration of camera links</li> </ul>
Wednesday	9:00 a.m.	5:00 p.m.	8 Hours	<u>Ongoing Camera Installation</u> <ul style="list-style-type: none"> <li>● Continued deploying security cameras across designated sites to ensure comprehensive equipment protection.</li> </ul>
Thursday	9:00 a.m.	5:00 p.m.	8 Hours	<u>Resuming Network Evolution Study - GPRS and EDGE</u> <ul style="list-style-type: none"> <li>● Explored the continuation of circuit-switched data transmission within the GSM framework</li> <li>● Dived into the transition to packet-</li> </ul>

				switched data transmission, focusing on GPRS <ul style="list-style-type: none"> <li>● Investigated the GPRS air interface, understanding communication dynamics and protocols</li> <li>● Explored the GPRS state model</li> </ul>
Friday	9:00 a.m	5:00 p.m.	8 Hours	<u>Continued Exploration of GPRS and EDGE</u> <ul style="list-style-type: none"> <li>● Explored network elements of GPRS and their roles within the system</li> <li>● Investigated radio resource management in GPRS, emphasizing efficient utilization and optimization</li> <li>● Explored various interfaces within the GPRS framework</li> <li>● Gained insights into GPRS mobility management and session management (GMM/SM)</li> </ul>

**Total Hours Spent in Training Per Week:- 40 Hours**

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Sonam Phuntsho

**(Name and Signature of student)**

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## STUDENT'S WEEKLY DIARY FOR “ON THE JOB TRAINING”

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### DAILY DIARY FOR WEEK VI (22/01/24 - 26/01/24)

Name of Student:- Sonam Phuntsho \_\_\_\_\_ Roll No. : 02200165 \_\_\_\_\_ Trade: BE IT \_\_\_\_\_

Address during OJT: Town, Paro \_\_\_\_\_

Name of Organization: Bhutan Telecom Limited \_\_\_\_\_

Name/Type of Work Carried Out During the Week:- Wireless Network & Security

Name of immediate Officer : \_\_\_\_\_

Designation:- \_\_\_\_\_

Day & Date	Time of Going to Work	Time of Leaving	Hours Spent on the day	Describe the type of work you have carried out.
Monday	-	-	-	On Leave (Headache)
Tuesday	9:00 a.m	5:00 p.m.	8 Hours	<u>Camera Link Rectification</u> <ul style="list-style-type: none"> <li>Conducted a site visit to address a broken camera link, ensuring swift resolution for uninterrupted surveillance</li> <li>Diagnosed the issue, pinpointing a malfunction in the RJ45 connector</li> <li>Replaced the faulty connector, swiftly restoring the camera link to full functionality.</li> </ul>
Wednesday	9:00 a.m.	5:00 p.m.	8 Hours	<u>UMTS and HSPA</u> <ul style="list-style-type: none"> <li>Explored key concepts shaping UMTS and technological advancements</li> <li>Investigated CDMA's role in UMTS networks</li> <li>Explored UMTS channel structure on the air interface</li> <li>Explored UTRAN, the terrestrial radio access network in UMTS, comprehending its architecture</li> <li>Explored mobility management within the core network of UMTS</li> <li>Gained insights into radio network mobility management for optimized connectivity during movement</li> </ul>
Thursday	9:00 a.m.	5:00 p.m.	8 Hours	<u>UMTS and HSPA continuation</u> <ul style="list-style-type: none"> <li>Explored UMTS call establishment for both circuit-switched (CS) and packet-switched (PS) services</li> <li>Delved into UMTS security measures, comprehending protocols and mechanisms for data protection</li> <li>Investigated HSDPA and HSPA+, focusing on high-speed data transmission enhancements within</li> </ul>

				<p>UMTS</p> <ul style="list-style-type: none"> <li>● Explored HSUPA, understanding enhancements for high-speed uplink data transmission in UMTS</li> <li>● Examined enhancements like Continuous Packet Connectivity (CPC) in both radio and core networks</li> <li>● Gained insights into managing radio resources efficiently within UMTS networks</li> </ul>
Friday	9:00 a.m	5:00 p.m.	8 Hours	<p><u>Introduction to LTE</u></p> <ul style="list-style-type: none"> <li>● Explored LTE network architecture and various interfaces</li> <li>● Delved into the Frequency Division Duplex (FDD) air interface and corresponding radio network components</li> <li>● Examined the Time Division Duplex (TD-LTE) air interface</li> <li>● Focused on LTE scheduling methodologies, grasping efficient resource allocation for optimal data transmission</li> <li>● Explored fundamental LTE procedures, mobility management, and power optimization</li> <li>● Examined LTE security architecture for robust data protection</li> <li>● Explored interconnection with UMTS and GSM for enhanced interoperability</li> <li>● Investigated carrier aggregation's role in optimizing data transmission</li> </ul>

**Total Hours Spent in Training Per Week:- 32 Hours**

1. I hereby certify that the above entries made are correct to the best of my knowledge

Sonam Phuntsho

**(Name and Signature of student)**

2. Certified that the information furnished are correct and have been verified by me.

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# COLLEGE OF SCIENCE AND TECHNOLOGY RINCHENDING – PHUENTSHOLING

## STUDENT'S WEEKLY DIARY FOR “ON THE JOB TRAINING”

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### DAILY DIARY FOR WEEK VII (29/01/24 - 02/02/24)

Name of Student:- Sonam Phuntsho \_\_\_\_\_ Roll No. : 02200165 \_\_\_\_\_ Trade: BE IT \_\_\_\_\_

Address during OJT: Town, Paro \_\_\_\_\_

Name of Organization: Bhutan Telecom Limited \_\_\_\_\_

Name/Type of Work Carried Out During the Week:- LTE and 5G Learning

Name of immediate Officer : \_\_\_\_\_

Designation:- \_\_\_\_\_

Day & Date	Time of Going to Work	Time of Leaving	Hours Spent on the day	Describe the type of work you have carried out.
Monday	9:00 a.m.	5:00 p.m.	8 Hours	<u>Advancing LTE Proficiency</u> <ul style="list-style-type: none"> <li>● Explored critical LTE network planning aspects</li> <li>● Investigated CS fallback for voice and SMS integration</li> <li>● Examined network sharing with Multi-Operator Core Network (MOCN) and Multi-Operator Radio Access Network (MORAN) for resource optimization</li> <li>● Explored antenna evolution and gigabit backhaul importance in LTE networks</li> <li>● Explored IPv6 integration implications in mobile networks</li> <li>● Examined Network Function Virtualization (NFV) concept in LTE networks</li> <li>● Gained insights into Machine Type Communication (MTC) and its role in IoT within LTE networks</li> </ul>
Tuesday	9:00 a.m.	5:00 p.m.	8 Hours	<u>VoLTE Introduction</u> <ul style="list-style-type: none"> <li>● Explored VoLTE fundamentals</li> <li>● Delved into Session Initiation Protocol (SIP) in VoLTE for communication session management</li> <li>● Explored VoLTE integration with IP Multimedia Subsystem (IMS), unraveling architecture and functionalities</li> <li>● Investigated complexities and solutions for seamless VoLTE roaming in diverse network environments</li> </ul>
Wednesday	9:00 a.m.	5:00 p.m.	8 Hours	<u>Foundational Insights into 5G</u> <ul style="list-style-type: none"> <li>● Examined 5G Non-Standalone mode architecture and key components</li> <li>● Explored TDD and FDD air interfaces in 5G</li> </ul>

				<ul style="list-style-type: none"> <li>● Investigated E-UTRA-NR Dual Connectivity (EN-DC) and scheduling strategies for optimal data transmission</li> <li>● Explored basic procedures and mobility management in 5G Non-Standalone mode</li> <li>● Examined critical considerations for efficient 5G network planning and deployment</li> <li>● Delved into 5G Standalone mode architecture and procedures</li> <li>● Explored standalone communication capabilities of the 5G air interface</li> </ul>
Thursday	-	-	-	On Leave (Rimdro at Home)
Friday	9:00 a.m	5:00 p.m.	8 Hours	Antennas and Organizational Dynamics <ul style="list-style-type: none"> <li>● Explored antennas and their bandwidth specifications, emphasizing their role in network selection (2G, 3G, or 4G).</li> <li>● Examined Remote Electrical Tilt (RET) concepts, covering mechanical and electrical tilt</li> <li>● Gained insights into the organizational structure of the Telecom industry</li> </ul>

**Total Hours Spent in Training Per Week:- 32 Hours**

1. I hereby certify that the above entries made are correct to the best of my knowledge

Sonam Phuntsho

**(Name and Signature of student)**

2. Certified that the information furnished are correct and have been verified by me.

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