

## **Indicator1: Connectivity and ICT Infrastructure Development Guidelines:**

### ***Major Activities:***

- a. Broadband Connectivity
- b. Secure Wi-Fi on campus
- c. Intranet development on campus to connect all the departments
- d. IT support unit with hardware and software

### **1. INTRODUCTION:**

This document provides a comprehensive framework for the establishment and management of campus network, Wi-Fi connectivity, and ICT infrastructure to support academic, research, and administrative functions efficiently and securely. The process begins with assessing internet user requirements, including the number of users, device types, and usage patterns, to estimate bandwidth needs and plan for full coverage across classrooms, laboratories, offices, and campus public spaces and finally necessary network design, connection with appropriate necessary Cables, routers, access point devices and robust IT support unit.

### **2. OBJECTIVES**

- Provide reliable and high-speed internet connectivity.
- Ensure full campus coverage for both wired and wireless networks.
- Establish a secure and scalable ICT infrastructure.
- Facilitate collaboration, learning, and innovation through robust technology solutions.

### **3. GUIDELINES:**

The campuses are suggested to follow following process to ensure successful completion of Connectivity and ICT Infrastructure Development indicator

#### **3.1. Network Planning and Design**

##### **I. Assessment of Requirements**

- Determine the number of users (students, faculty, and staff). Assess internet bandwidth requirements based on user types and activities in campus.
- Identify core services (EMIS,HR,account,email, online data entry and reporting software, LMS, video conferencing, etc.).
- Coverage: Plan for full coverage, including classrooms, laboratories, hostels, offices, and public spaces and ensure the design can support future growth.

##### **II. Network Topology:**

- Use a star or hybrid network topology approach combining wired and wireless networks for efficiency and flexibility. Implement structured cabling for wired connections.
- Use access points strategically for optimal Wi-Fi coverage.

**3.2 a) Broadband connectivity:** Consult with Internet service provider (ISP) company and setup a high-speed internet connection based on campus internet user (students, teachers and staffs) and Ensure Wi-Fi connectivity around campus premises.

- The campuses should setup Broadband high-speed connection. The broadband connection can be dedicated or non-dedicated (shared) internet connection. The minimum Broadband bandwidth will be varied on geographical location, number of students, Teachers and Staff but ensure minimum 20 Mbps.
- The campus should ensure Wi-Fi connectivity around campus premises, the campus can add and configure additional secondary router or wireless access point devices according to their location of department, sections, class room, library etc. Devices should comply Government standard tools.
- To check internet bandwidth, campus can use Multi Router Traffic Grapher (MRTG) free software for monitoring and measuring the traffic load on network links and should check traffic load on a network over time (2-3 weeks) in graphical form and submit screenshot in progress report.

**b) Secure Wi-Fi on Campus:**

A secure campus Wi-Fi network is essential to protect sensitive information, maintain service reliability, and prevent unauthorized access. Below are best practices and guidelines for securing a campus Wi-Fi network:

- To secure campus Wi-Fi, Use Highly Protected Router with WPA2 802.11i or more standard like Wireless Security Standards like WPA2/3 (Wi-Fi Protected Access )which are used to encrypt and secure Wi-Fi connections, preventing unauthorized access to the network.
- The routers and wireless access point devices should be authorized by Nepal Telecom authority.

**Security Features on Access Points**

- Regular Firmware Updates: Keep access points updated with the latest firmware to fix vulnerabilities.
- Power and Signal Control: Reduce the Wi-Fi signal range to limit access outside campus boundaries.

**Network Monitoring and Logging**

- Real-Time Monitoring: Deploy network monitoring tools to track unusual activity, such as excessive bandwidth usage or unauthorized access attempts.

**Password Management:**

- Enforce strong, unique passwords for network access and Change Wi-Fi passwords periodically.

**c) Intranet development on campus to connect all the departments**

The main objective of campus intranet development is to facilitate communication, collaboration, and information sharing among campus employees. The campus can hire vendor party to create internal local area networking (LAN) to connect all department, sections and unit with full fledge internet access.

**Network Design**

- Design a scalable and secure network topology (e.g., star, hybrid) and connect campus all department and section computers and finally ensure internal resource sharing and internet connection in campus computers.
- Use latest Ethernet cables, Routers, Wireless access point devices to create internal networking and extending internet.
- Manage electricity to ensure internet availability.
- Draw Internal local area networking (LAN) sketch diagram or Picture to show evidence of internal local area networking connecting campus all department and unit’s computers.

**d) IT support unit with hardware and software**

- The campus should establish and formulate dedicated support IT unit with IT staff and provide adequate hardware (I.e. Desktop, Laptop, Networking equipment’s and related supporting devices).

**Note: Verification Protocol for Connectivity & ICT Infrastructure Indicator**

<b>Digitalization Activities</b>	<b>Requirements</b>	<b>Verification</b>
<b>Connectivity &amp; ICT Infrastructure</b>	a) Broadband Connectivity b) Secure Wi-Fi on campus c) Intranet development on campus to connect all the departments d) IT support unit with hardware and software	- Broadband internet connection established MOU/Contract copy (valid, recent renewed)/Payment receipt with internet service provider (ISP). - Multi Router Traffic Grapher (MRTG) ( Screen shots of Internet connection Speed) (minimum 20mbps) - IT support unit formation copy decision along with necessary hardware and software’s setup letter. - Procurement Records of Hardware if any. - Network Design (Local Area Networking) Diagram/Picture with routers and access point

