



SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)



UNIT-V- Wide Area Network

(WAN)

Wide Area Network (WAN)



A Wide Area Network (WAN) in the context of a smart grid refers to the communication infrastructure that connects various elements of the smart grid over a wide geographic area. The smart grid is an advanced electrical grid that uses modern communication and information technology to gather and act on information in an automated fashion. A WAN plays a crucial role in enabling communication and data exchange between different components of the smart grid, ensuring efficient and reliable operation. Here are some key aspects of the WAN in a smart grid:



1. Remote Monitoring and Control:

1. Supervisory Control and Data Acquisition (SCADA): WAN facilitates the exchange of real-time data between the central SCADA system and remote devices such as sensors, smart meters, and intelligent electronic devices (IEDs). This allows for remote monitoring and control of grid operations.



Wide Area Network (WAN)



- **Smart Metering:**
 - **Two-Way Communication:** WAN enables two-way communication between utility companies and smart meters installed at consumers' premises. This allows for the collection of consumption data, remote meter reading, and the implementation of demand-response programs.
- **Distribution Automation:**
 - **Communication with Intelligent Devices:** WAN connects distribution automation devices such as reclosers, voltage regulators, and capacitor banks. This enables real-time communication for fault detection, isolation, and service restoration, improving the reliability of the distribution system.
- **Cybersecurity:**
 - **Secure Data Transmission:** As the smart grid involves the exchange of sensitive data, including consumption patterns and grid status, the WAN must incorporate robust cybersecurity measures to protect against unauthorized access and cyber threats.
- **Integration of Renewable Energy Sources:**
 - **Communication with Distributed Energy Resources (DERs):** WAN facilitates communication with and control of distributed energy resources such as solar panels, wind turbines, and energy storage systems. This integration helps in managing the variability and unpredictability of renewable energy sources.



Wide Area Network (WAN)



- **Wide Area Protection and Control:**

- **Phasor Measurement Units (PMUs):** WAN supports the deployment of PMUs for wide-area monitoring of the power system. PMUs provide synchronized measurements of voltage and current across different locations, allowing for better situational awareness and control.

- **Interoperability:**

- **Standard Protocols:** WAN in the smart grid often relies on standard communication protocols such as IEC 61850, DNP3, and Modbus to ensure interoperability among devices and systems from different manufacturers.

- **Resilience and Redundancy:**

- **Redundant Paths:** To ensure the reliability of communication, WANs in smart grids often incorporate redundant paths and backup systems to minimize the impact of network failures.

- The effective deployment of a WAN in a smart grid is essential for realizing the full potential of the smart grid, including improved efficiency, reliability, and integration of renewable energy resources. It also plays a critical role in enhancing the grid's ability to adapt to changing conditions and respond to disturbances in a timely and automated

manner.



THANK YOU