**ID:\_** K240381**\_\_ Name:** Wasik Gaus

**DCAN202 Week 8 Tutorial – Data Communication and Networking**

1. Discuss Convergence with example.

Ans: Convergence in networking refers to the integration of previously distinct technologies, services, or networks into a unified system. This merging optimizes resource utilization, reduces costs, and enhances functionality. Below are key examples of convergence in modern data communication and networking:

**1. Computer-Telephony Integration (CTI)**

CTI merges traditional voice networks with computer systems, enabling advanced communication workflows. For instance, when a customer calls a support line, their phone number automatically retrieves their records on the agent’s computer screen. The agent can answer, transfer, or log calls directly through software interfaces, eliminating manual processes. This integration improves customer service efficiency and reduces human error. CTI also allows voice cabling to coexist with data networks, enabling features like voicemail-to-email and automated call routing based on database triggers.

**2. Unified Communications (UC)**

UC combines real-time tools (voice calls, video conferencing) with non-real-time services (email, voicemail) into a single platform. For example, Microsoft Teams integrates chat, video meetings, and file sharing, allowing users to switch seamlessly between communication modes. This convergence eliminates the need for disjointed applications, streamlining collaboration. UC also supports presence information, showing a user’s availability across devices, which enhances workplace productivity.

**3. IT/OT Convergence in Industrial IoT**

Industrial IoT (IIoT) merges Information Technology (IT) and Operational Technology (OT) networks. IT systems (data analytics, cloud computing) integrate with OT systems (factory machinery, sensors) to enable real-time monitoring and automation. For example, in smart manufacturing, sensors on production lines send data to cloud-based AI models that predict equipment failures. However, this convergence introduces cybersecurity risks, as previously isolated OT systems become exposed to IT network vulnerabilities.

**4. 5G and Edge Computing in Smart Grids**

5G networks and edge computing converge to support smart grids, which manage electricity distribution. High-speed 5G enables real-time data transmission from sensors on power lines to edge servers. These servers process data locally (e.g., detecting faults via video analytics) instead of sending it to distant cloud servers. This reduces latency, allowing faster responses to outages. For example, a smart grid might reroute power automatically during a line fault, minimizing downtime.

**5. Mobile Edge Networks (MEC)**

MEC integrates computing, caching, and communication at the network edge. For instance, in autonomous vehicles, edge servers process sensor data locally to make instant driving decisions, avoiding delays from cloud communication. Similarly, augmented reality (AR) applications use edge caching to store frequently accessed data (e.g., 3D models) closer to users, reducing lag. This convergence is critical for latency-sensitive applications like remote surgery or real-time gaming.

**Challenges of Convergence**

* **Security Risks**: Integrating systems (e.g., IT/OT) exposes vulnerabilities.
* **Complexity**: Managing hybrid networks requires advanced expertise.
* **Interoperability**: Legacy systems may not support new protocols.

1. Learn about Cisco Packet Tracer from the link below:  
   <https://www.netacad.com/cisco-packet-tracer>

Create a wireless LAN using Packet tracer. Show that you ping devices connected to wireless LAN. Now follow the YouTube video below and learn how to create a wireless network.

<https://www.youtube.com/watch?v=84rpfWWU22Q>

Change the PC name with your first name. Add Screenshots so that wireless devices can ping LAN computers.



