LAN WITH SWITCHES AND ROUTERS

WIDE AREA NETWORK

Time: 60 mins

Introduction

In this class, student/s will learn how to create multiple LANs and connect them through a router to create a WAN.

Vocabulary

- **Switch** is the physical networking device which helps communicate within the LAN.
- **Router** is a physical device which helps connect and communicate between different LANs.
- **MAC(Media Access Control) address** is a unique identifier of a device provided by the manufacturer.
- **WAN** is a wider area network which is not tied to a single location and can expand to the entire world.

Learning Objectives

Student/s should be able to:

- ***Recall*** how the local network and internet works.
- ***Explain*** the use of switches to communicate within the LAN and use of routers to connect devices on different LANs.
- ***Demonstrate*** how to simulate a packet transmission within a LAN and a WAN using Cisco packet tracer.

Activities

1. **Class Narrative:** *(3 mins)*
    - Brief the student/s of the various networking devices and types of network used in real life for communication.
    - Introduce the characters and how they decide to facilitate multi player gaming across the cities.
2. **Concept Introduction Activity:** *(4 mins)*
    - Let the student/s undertake the explore-activity to observe the packet transfer in a Wide Area Network.
    - Using the slides, explain that the student/s will learn:
        - to send data within the LAN
        - to add a new LAN to the network
        - connect different LANs using a router

3. **Activity 1:Send Data on LAN** *(14 mins)*

   Teacher Activity: *(7 mins)*

   - Explain the difference between MAC address and IP address.
   - Demonstrate how to add and configure a switch to the LAN and simulate the packet transfer between 2 devices within the LAN using Cisco packet tracer.

   Student Activity: *(7 mins)*

   - Guide the student/s to add a switch to the LAN and send a packet between two devices without multicasting.

4. **Activity 2: Add New LAN** *(12 mins)*

   Student Activity: *(6 mins)*

   - Explain to student(s) that we need another LAN to test the transfer of packets across LAN.
   - Guide the student/s to create another LAN with a switch in the workspace of the packet tracer.

5. **Activity 3: Create a WAN** *(12 mins)*

   Teacher Activity: *(6 mins)*

   - Introduce the student/s to different ports and cables used to connect different types of networking devices.
   - Explain how a router is used to connect multiple LANs using their IP addresses.
   - Demonstrate how IP addresses and ports are assigned to configure the router correctly with switches.

   Student Activity: *(6 mins)*

   - Guide the students to connect the two LANs and send a packet between devices on different LANs.
   - Explain to student(s) that this multiple LAN network is actually a WAN.

6. **Introduce the Post class project:** *(2 min)*

   - Help the school networking team to troubleshoot the communication error between 2 PCs on the school network.

7. **Test and Summarize the class learnings:** *(5 mins)*

   - Check for understanding through quizzes and summarize learning after respective missions.

- Summarize the overall class learning towards the end of the class.

8. **Additional activities:**
    - Encourage the student/s to add another device on both the LANs and simulate a packet transfer between these new devices.
    - Encourage the student/s to add another LAN to the existing network.

9. **State the Next Class Objective:** *(1 min)*
    - In the next class, student/s will learn about different types of network topologies.

U.S. Standards:

CSTA: 2-CS-02, 2CS-03, 2-NI-04, 2-AP-10, 2-AP-19

Links Table		
Activity	**Activity Name**	**Link**
Class Presentation	LAN with Switches and Routers	https://s3-whjr-curriculum-uploads.whjr.online/499c60c8-9af5-44f1-9e65-ef37a2bd4d3e.html
Explore Activity	LAN with Switches and Routers	https://github.com/Tynker-Computer-Networks/TNK-M14-C106-SAS-BP
Teacher Activity 1	Send Data on LAN	https://github.com/Tynker-Computer-Networks/TNK-M14-C106-TAS-BP
Teacher Reference: Teacher Activity 1 Solution	Send Data on LAN	https://github.com/Tynker-Computer-Networks/TNK-M14-C106-TAS
Student Activity 1	Send Data on LAN	https://github.com/Tynker-Computer-Networks/TNK-M14-C106-SAS-BP
Teacher Reference: Student Activity 1 Solution	Send Data on LAN	https://github.com/Tynker-Computer-Networks/TNK-M14-C106-SAS
Student Activity 2	Add New LAN	https://github.com/Tynker-Computer-Networks/TNK-M14-C106-SAS-BP
Teacher Reference: Student Activity 2 Solution	Add New LAN	https://github.com/Tynker-Computer-Networks/TNK-M14-C106-SAS
Teacher Activity 3	Create a WAN	https://github.com/Tynker-Computer-Networks/TNK-M14-C106-TAS-BP
Teacher Reference: Teacher Activity 3 Solution	Create a WAN	https://github.com/Tynker-Computer-Networks/TNK-M14-C106-TAS
Student Activity 3	Create a WAN	https://github.com/Tynker-Computer-Networks/TNK-M14-C106-SAS-BP

Teacher Reference: Student Activity 3 Solution	Create a WAN	https://github.com/Tynker-Computer-Networks/TNK-M14-C106-SAS
Student's Additional Activity 1	Update the LANs	https://github.com/Tynker-Computer-Networks/TNK-M14-C106-SAS-BP
Teacher Reference: Student's Additional Activity 1 Solution	Update the LANs	https://github.com/Tynker-Computer-Networks/TNK-M14-C106-SAS
Student's Additional Activity 2	Upgrade the WAN	https://github.com/Tynker-Computer-Networks/TNK-M14-C106-SAS-BP
Teacher Reference: Student's Additional Activity 2 Solution	Upgrade the WAN	https://github.com/Tynker-Computer-Networks/TNK-M14-C106-SAS
Post Class Project	Troubleshoot the Network	https://github.com/Tynker-Computer-Networks/TNK-M14-C106-PCP-BP
Teacher Reference: Post Class Project Solution	Troubleshoot the Network	https://github.com/Tynker-Computer-Networks/TNK-M14-C106-PCP