The Internet of Everything…Naturally! (Instructor Version)

Instructor Note: Red font color or Gray highlights indicate text that appears in the instructor copy only.

Objectives

Explain the need for IPv6 network addresses.

This is an application-based activity. Students develop a plan to show how IoE subnets, unicasts and multicasts could be used in our daily lives to affect data communication.

Background /Scenario

(Note: This activity may be completed individually or in small/large groups.)

This chapter discussed the ways that small to medium-sized businesses are connected to networks in groups. The IoE was introduced in the modeling activity at the beginning of this chapter.

For this activity, choose one of the following:

- Online banking
- World news
- Weather forecasting/climate
- Traffic conditions

Devise an IPv6 addressing scheme for the area you have chosen. Your addressing scheme should include how you would plan for:

- Subnetting
- Unicasts
- Multicasts

Keep a copy of your scheme to share with the class or learning community. Be prepared to explain:

- how subnetting, unicasts, and multicasts could be incorporated
- where your addressing scheme could be used
- how small to medium-size businesses would be affected by using your plan

Instructor Note: This Modeling Activity is not intended to be a graded assignment. Its purpose is to encourage students to reflect on their perceptions of how a network could use IPv6 and the undecillion addresses available both for personal and corporate practice. Instructors should facilitate class discussion and idea sharing as a result of this activity.

Required Resources

- Paper, pens or pencils, or tablets
- Packet Tracer (if you would like to display how your network would look physically)
- Hard or soft copy of the final network topology with IPv6 addressing indicated for sharing with the class.

Reflection

1. What was the hardest part of designing this network model? Explain your answer.

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Answers will vary within groups (as will the topologies developed). Some students may mention designing a main group and then subnetted groups from the main group, some may indicate the actual addressing of the network, some may indicate they had difficulty with where unicasts and multicasts could occur.

A possible solution to the scenario might include:

Weather Forecasting/Climate

The area in which you live has many hot days during summer months. Electricity costs skyrocket on those days.

Your local electrical area includes 6 local cities and all of these cities are then incorporated into one, large state. Multiple states are incorporated into one large country. To decrease costs and increase productivity of electricity, you could install windmills or solar panels that would generate electrical current to your immediate area and larger geographic areas. The windmills or solar panels could be controlled using network accessibility.

Using an IPv6 addressing scheme:

- Each windmill (or solar panel) will be assigned an IPv6 address.
- Windmills and/or solar panels will be turned on to generate electricity by, city, state or country (subnetting).
- Cities, states or countries will receive additional electricity based on unicast or multicast operation of the windmills/solar panels.

(Note: Depending on the focus or use of this activity, students could actually draw a schematic of their windmills or solar panels and address them to show mastery of the subnetting concept. They could also group the windmills or solar panels to show unicast or multicast transmissions types.

Other possible scenarios might include:

1. Energy Efficiency

- Each household light bulb could be connected to the network and remotely managed. Each one would therefore need an IPv6 address.

- Each home appliance should also be connected to the network and would also need IPv6.

- The network structure could group all appliances of a home into one subnet. Route summaries could be created to group neighborhoods together. Unicast messages would be used to manage single devices. Appliances of the same type could have a multicast group (all TVs, for instance) and managed in bulk.

2. Weather Forecast

- Sensor on trees would need IPv6 addresses to be connected to the network

- Mobile weather stations would also need IPv6 (several stations per city, for accuracy)

- Floating weather stations would gather info about the oceans and rivers and also need IPv6

- Once again route summaries would group/represent physical locations. Multicast groups could be created based on station placement (land, river, and ocean) and unicast addresses used to manage a specific station

3. Traffic Conditions

- Each traffic light would need an IPv6 to be connected to the network.

- Road traffic sensors (to provide the rate vehicle/minute) could also be connected to the network and would need IPv6 addresses.

- Multicast groups could be created based on device type (sensor or traffic light) and unicast addresses could be used to manage a specific device.

Identify elements of the model that map IT-related content:
- Internet of Everything (IoE) – green technology
- Subnetting
- IPv6 addressing
- Unicasts
- Multicasts