Tests - Infrastructures

Questions

Question 1: PON transmission control

How is the problem arising in a PON when a number of Optical Network Units (ONU) try to transmit simultaneously solved?

a) The problem cannot be solved, but the ONUs are able to retransmit after a collision of their packets.

b) The power emitted by all the ONUs is regulated in order to have the same value.

c) The OLT controls the transmissions of the ONUs by giving the right scheduling to avoid collisions.

d) The ONUs buffer their data until they find the fiber free for their transmission.

Question 2: Wavelength Division Multiplexing (WDM)

How is Wavelength Division Multiplexing (WDM) used in fiber-optic transmission for a PON?

a) If we have 10 different wavelengths, we can have 10 different colors contemporarily in the same fiber.

b) The same Optical Network Unit can transmit different packets on different wavelengths.

c) One wavelength is used for the downstream and one for the upstream.

d) If we have 10 different wavelengths, we can have 10 different fibers contemporarily in the same cable.

Question 3: Passive Optical Networks benefits

What are the benefits of Passive Optical Networks (PON) compared to Active Optical Networks?

a) The infrastructure cost is lower due to simpler equipment and fewer active components.

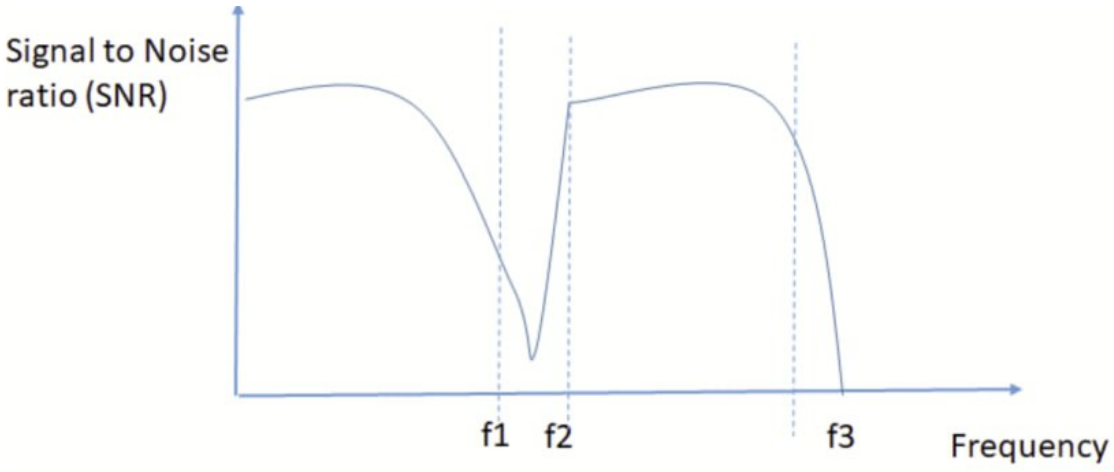
b) It's easier to manage thanks to the use of Ethernet-based approaches.

c) You avoid the need for Optical Network Units at the user side.

d) You only need to replace damaged components, not the entire system.

Question 4: ADSL channel behavior and Discrete Multitone Technology (DMT)

Considering an ADSL line with frequencies fully attenuated (low SNR) in certain ranges, how should a modulation based on Discrete Multitone Technology (DMT) handle these frequencies?



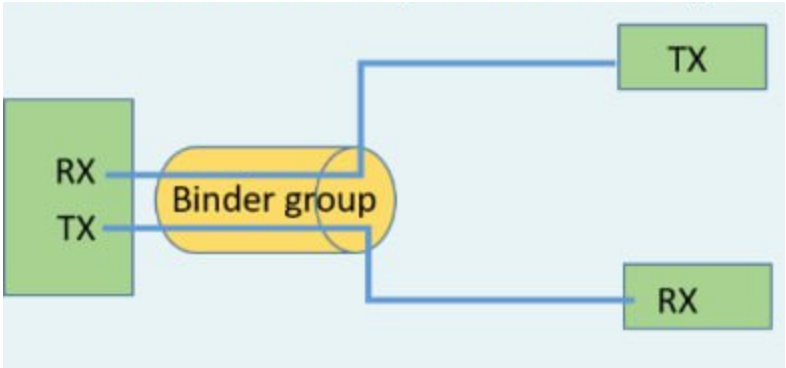
a) It should include transmitting "tones" in the frequency band below f1 and between f2 and f3.

b) It must include only transmitting "tones" in the frequency band between f2 and f3.

c) It should include transmitting "tones" only in the frequency band below f1.

Question 5: Cross-talk in shared cable paths

What type of cross-talk might arise when two pairs of cables share an initial path before diverging?



a) The Near End Cross Talk.

b) None of the cross talks may arise in this setting.

c) Both the two kinds of cross-talks may arise.

d) The Far End Cross Talk.

Question 6: FTTX configurations and deployment cost

Which of the FTTX configurations has a higher deployment cost?

a) FTTB - to the building.

b) The cost is identical, given the fact that fibers shall be deployed in this access network part.

c) FTTC - to the curb.

d) FTTE - to the exchange.

Question 7: Water filling algorithm in ADSL

When are the advantages of applying the water filling algorithm in an ADSL system most noticeable?

a) The channel behavior both in the upstream and downstream has a flat (constant) signal-to-noise ratio.

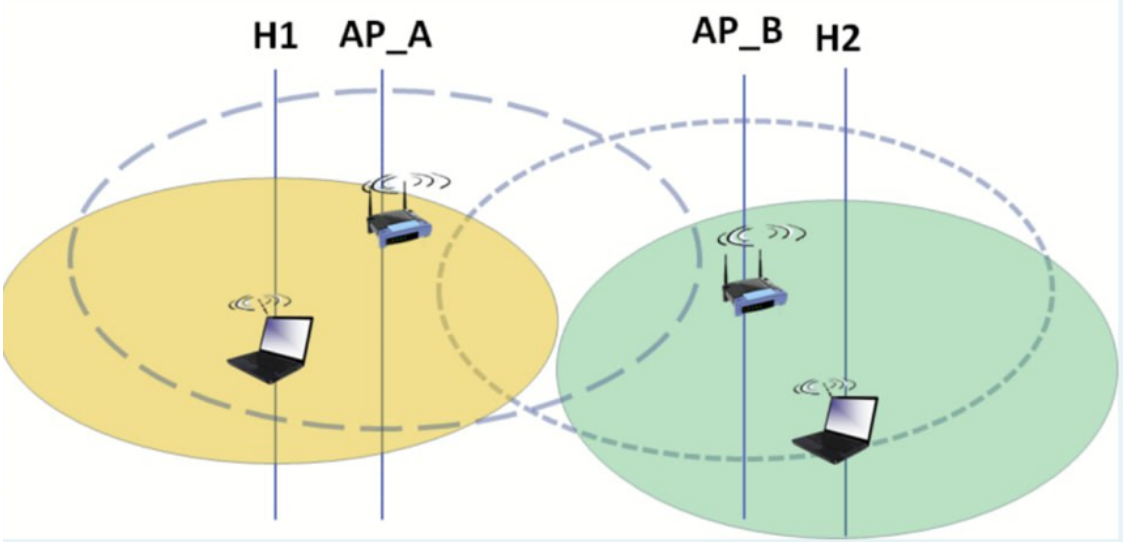
b) It is important to separate the telephone bandwidth from the one used by the data.

c) It is important to split the transmission into two parts: downstream and upstream.

d) The channel behavior both in the upstream and downstream has not a flat (constant) signal-to-noise ratio.

Question 8: Hidden terminal problem in a network with Access Points and Hosts

In a network with two Hosts (H1 and H2) and two Access Points (AP_A and AP_B) sharing the same frequency band, can H1-AP_A and H2-AP_B transmit simultaneously?



a) We cannot have contemporary transmissions of H1-AP_A and H2-AP_B since H1 and H2 are hidden terminals.

b) We can have contemporary bidirectional transmissions of H1-AP_A and H2-AP_B since H1 and H2 are in two separate coverage areas, and the same happens for the Access Points.

c) We cannot have contemporary bidirectional transmissions of H1-AP_A and H2-AP_B since AP_A and AP_B have an overlapping coverage area.

Question 9: VDSL improvements

Which are the two improvements enabling the VDSL?

a) The use of the DMT modulation in the copper cables and the full cancellation of the cross-talk noise from the CO to the end user.

b) The use of high frequencies in the fiber optic cables and the cancellation of the interference arising in the fiber optic domain.

c) The vectoring of the signals in the fibers cables that arrive till the end users and the positioning of the ONU close to the end users.

d) The vectoring of the signals in the copper cables and the placement of the DSLAM (where the fiber ends) close to the end user.

Question 10: Importance of latency in future wireless systems

In the future generation wireless systems, the latency will become a key performance metric. Why is it becoming so important?

a) Future mobile applications will use high data processing and computation.

b) Many mobile applications will require high responsiveness in the interaction with the network.

c) The end users may have high mobility during their connection.

d) Many mobile applications will require high throughput (bit rate) at the end users.

Question 11: Critical impairment in wireless infrastructure

Which is the most critical impairment in a wireless infrastructure when multiple end users access the wireless link?

a) The multipath, since we have multiple users.

b) The path loss, since multiple users may be very distant from the base station.

c) The interference that they may generate one with the other if the multiple access is not suitably controlled.

Question 12: Water filling algorithm in ADSL

Suppose to apply the water filling algorithm in an ADSL system. The main advantages of this approach are attained when:

a) The channel behaviour both in the upstream and in the downstream has a flat (constant) signal to noise ratio.

b) It is important to separate the telephone bandwidth for the one used by the data.

c) It is important to split in two parts the transmission in the downstream and in the upstream.

d) The channel behaviour both in the upstream and in the downstream has not a flat (constant) signal to noise ratio.

Question 13: Fiber cut in optical subnetworks

Considering two all optical subnetworks (say A and B) interconnected through an OXC. Assuming that there is a fiber cut in the subnetwork A, then:

a) All the FDI signals are propagated from A to B.

b) Only OTS-FDI are propagated from A to B.

c) No FDI signals are propagated from A to B.

d) Only ODU-FDI are propagated from A to B.

Question 14: Topologies for networks in access part

Which are the most used topologies for networks in the access part?

a) Mesh and bus.

b) Rings.

c) Stars and rings.

d) Bus.

Question 15: Best configuration in terms of expected bit rate

Which one of these configurations is the best in terms of expected bit rate?

a) FTTC - to the curb.

b) ADSL.

c) FTTE - to the exchange.

d) FTTB - to the building.

Question 16: Role of the EDGE in a network

What is the EDGE of a network and which is its role?

a) The very core part of a network where powerful network functions are implemented.

b) That part of the network between the access and the core with some intelligent functions.

c) The very peripheral part of the network where only simple functions are implemented.

d) The very peripheral part of the network where all the applications are.

Question 17: Cross-talk noise on ADSL

What is the cross-talk noise on ADSL?

a) A noise that is generated at a generic receiver within a copper cable.

b) The coupling of signals from a circuit to another giving rise to undesired interference.

c) The interference of a signal in a frequency band to signals in other frequency bands of the ADSL.

d) A noise that is generated at a generic receiver within a fiber cable.

Question 18: Evolution of the access network

The evolution of the current access network aims at:

a) Employing fiber cables instead of copper ones.

b) Providing an ADSL access to all the users.

c) Using in a more capillary way the already existing infrastructure based on copper cables.

d) Using only wireless access given its flexibility and low cost.

Question 19: Key element of ADSL success

One of the key elements of ADSL success is related to:

a) The use of the same copper cable of the old telephone network.

b) The fact that no new network elements are needed at the Central Office side.

c) The use of the same frequency band of the old telephone network.

d) The use of new fiber cables in place of the old telephone ones.

Solutions

- **Question 1**: c) The OLT controls the transmissions of the ONUs by giving the right scheduling to avoid collisions.

- **Question 2**:a) If we have 10 different wavelengths, we can have 10 different colors contemporarily in the same fiber.
- **Question 3**: a) The infrastructure cost is lower due to simpler equipment and fewer active components.
- **Question 4**: a) It should include transmitting "tones" in the frequency band below f1 and between f2 and f3.
- **Question 5**: a) The Near End Cross Talk.
- **Question 6**: a) FTTB - to the building.
- **Question 7**: d) The channel behavior both in the upstream and downstream has not a flat (constant) signal-to-noise ratio.
- **Question 8**: b) We can have contemporary bidirectional transmissions of H1-AP_A and H2-AP_B since H1 and H2 are in two separate coverage areas, and the same happens for the Access Points.
- **Question 9**: d) The vectoring of the signals in the copper cables and the placement of the DSLAM (where the fiber ends) close to the end user.
- **Question 10**: b) Many mobile applications will require high responsiveness in the interaction with the network.
- **Question 11**: c) The interference that they may generate one with the other if the multiple access is not suitably controlled.
- **Question 12**: d) The channel behaviour both in the upstream and in the downstream has not a flat (constant) signal to noise
- **Question 13**: b) Only OTS-FDI are propagated from A to B.
- **Question 14**: c) Stars and rings.
- **Question 15**: d) FTTB - to the building.
- **Question 16**: b) That part of the network between the access and the core with some intelligent functions.
- **Question 17**: b) The coupling of signals from a circuit to another giving rise to undesired interference.
- **Question 18**: a) Employing fiber cables instead of copper ones.

- **Question 19**: a) The use of the same copper cable of the old telephone network.