

Practice Exam Questions for Nokia Optical Transport for Mobile Services (exam number: 4A0-240)

The following questions will test your knowledge and prepare you for the Nokia Optical Transport for Mobile Services exam. Compare your responses with the Answer Key at the end of the document.

1. Which of the following is one of the most important advantages of the TPS solution in Fronthaul networks?
 - a. With migration to Ethernet Fronthaul, the TPS solution helps reducing latency because of missing OTN/WDM uplink/FEC component.
 - b. With migration to Ethernet Fronthaul, the TPS solution helps reducing bandwidth because of missing OTN/WDM uplink/FEC component.
 - c. With migration to Ethernet Fronthaul, the TPS solution helps reducing non-linear effects because of missing OTN/WDM uplink/FEC component.
 - d. With migration to Ethernet Fronthaul, the TPS solution helps reducing power consumption because of missing OTN/WDM uplink/FEC component.
2. Which of the following statement is true about cTE and/or dTE?
 - a. cTE is deterministic and therefore can be corrected/compensated, while dTE is non-deterministic and may or may not be corrected, depending on the payload type.
 - b. cTE is mainly caused by node/link asymmetry while dTE is mainly caused by PDV and noise generated by specific physical/transport layer.
 - c. dTE can be corrected through a calibration procedure driven by the operator during the installation phase, while cTE must be corrected real time, through complex DSPs.
 - d. Switched OTN and WDM ROADMs photonic layers have link asymmetry (cTE) which can be compensated by manual configuration while IP/MPLS, PTN and PSN networks introduce more variable latency asymmetry (dTE).
3. Which of the following are working modes for the PTPIOC card?
 - a. Centralized clock mode, lambda conversion mode, and relay mode.
 - b. CRU clock mode, lambda conversion mode, and relay mode.
 - c. Centralized clock mode, lambda pass-through mode, and relay mode.
 - d. Centralized clock mode, lambda conversion mode, and pass-through mode.

4. What happens in case of fiber cut when using a PTPIOC card?
 - a. APR works with PTPIOC as the card is equipped with specific pluggables to manage fiber cut cases directly (instead of relying on the amplifiers).
 - b. APR works with PTPIOC, except in the case where there is a fiber cut in the OSC fiber (from node A to node Z) and - at the same time - node A is equipped only with the ingress amplifier (no egress line driver).
 - c. APR works with PTPIOC as the amplifiers are fibered so that they still can manage the fiber cut condition, and therefore the APR status.
 - d. APR feature is not supported anymore if the PTPIOC is used, since the OTC signal flows instead of the OSC signal in one of the two directions.
5. 5G networks define several criteria to measure the bandwidth. What is the 3GPP target for 5G “user-experienced” data rate?
 - a. Performances depend on the deployment scenarios; for instance, up to 1Gb/s should be supported in environments such as indoor hotspots.
 - b. At least 800Mb/s should be experienced everywhere with higher bandwidth peaks in specific environments.
 - c. 3GPP defined a rate of up to 1Gb/s with a maximum latency of 25ms end-to-end to be measured during the data transfer peak.
 - d. 3GPP has not defined any “user-experienced” data rate; the peak data rate has been defined as well as the minimum data rate performance everywhere (worst condition).
6. Which of the following statements is true about 5G radio split options and bandwidth?
 - a. If all possible layers are moved away from the antenna, the bandwidth on the link between those layers and the antenna is very low as only I/Q data should be transmitted there.
 - b. With a low-layer split, the layers co-located with the antenna is typically only layer 1 and therefore the bandwidth towards the other layers is low (e.g., 1Gbps).
 - c. With a high-layer split, the layers co-located with the antenna is typically only layer 1 and therefore the bandwidth towards the other layers is low (e.g., 1Gbps).
 - d. In classical RAN configurations (e.g., T- or D-RANs), several components are co-located with the radio site. This means that the bandwidth on the link towards the BBU is not very high, compared with low-layer splits.
7. What are the pros/cons of splitting the BBU functions in CU and DU?
 - a. A split architecture allows load management, real-time performance optimization, and coordination of performance features. Moreover, virtualized deployments are possible.
 - b. A split architecture allows for better performances; however, it is more expensive as the related hardware implementation doesn't allow cost-effective solutions.
 - c. Splitting CU and DU enables network adaptation to various use cases so that the same network can be used at the same time for different purposes. This increases the experienced latency and thus, this is not suggested for latency-critical use cases.
 - d. CU and DU can be split only if the NGC is used. EPC doesn't support this kind of network split.

8. Which of the following is true about the 5G packet core network?
- a. The 5G packet core stores all data required by all the VNFs in a single repository that is shared by all core VNFs. This shared repository is internal only and thus, not visible to external third parties who might want to use them for content development.
 - b. The 5G packet core must be access-agnostic; that is, it should support a wide range of standard-based access technologies including wireless licensed and shared spectrum. Fixed access and wireless unlicensed might not be supported.
 - c. The 5G packet core must adhere to the CUPS architecture; separating the user-plane and control-plane nodes in the core network allows for independent scaling of nodes. Also, this separation removes overlaps and provides signaling efficiency.
 - d. The 5G core network creates multiple logical network instances (i.e., network slices) on top of a common shared physical infrastructure. Each slice is static and will serve specific pre-defined users based on the agreed performances (throughput, latency, etc.).
9. Which of the following peculiarities are specific for TDMA?
- a. TDMA is a technology where antennas are expensive and complex; the uplink is difficult due to the limitations of the handsets in terms of precision.
 - b. TDMA-based networks do not require tight coordination and synchronization. Moreover, transmissions are inherently secure thanks to the encoding.
 - c. TDMA is inefficient and somewhat inflexible in the case of unevenly distributed traffic among users. Moreover, a tight filtering is necessary and requires costly filters to reduce adjacent channel interference.
 - d. With TDMA transmissions, the handoff is easier. Therefore, it is best suited for fixed-rate communications such as voice calls.
10. Which of the following statements is correct about LTE mobile networks?
- a. In LTE networks, all data is handled by a packet-switched network, although, the handover with older network generation is supported.
 - b. An LTE-based network handles Internet data through a packet-switched network while voice can also be handled via a circuit-switched network. Handover with older network generation is supported only if the calls are originated in a packet-switched network.
 - c. In the recent LTE networks, advanced features such as OFDM, MIMO, CA and eICIC are supported.
 - d. LTE networks are based on EPC, but, it needs to be upgraded to the new 5GC. In such a case, the upgrade path is named "option 9".
11. What are the characteristics of a distributed RAN?
- a. The antenna is connected to the BBU locally (co-located).
 - b. The antenna site includes the RRH with no baseband processing on site.
 - c. The antenna site includes RRH and CU. Additionally, the DU/BBU is located further away in a centralized location.
 - d. The antenna site includes RRH and DU. Additionally, the CU/BBU is located further away in a centralized location.
12. C-RAN enables several network types, depending on the use case. Which of the following are typical C-RAN network types?
- a. Cloudified cells (BBUs and RRHs are running as VMs) and physical cells (BBUs and RRHs a dedicated machines).
 - b. Small reach (shared RRH units), medium reach (shared BBU units), and long reach (one BBU per cell).
 - c. Macro (one single BBU manages multiple macro cells) and small (multiple BBUs, one per small cell, are deployed).
 - d. Private (small cells), local (small cells + macrocells), and wide C-RAN (macro cells).

13. What is the meaning of network “cloudification”?
 - a. Cloudification means virtualizing BBU and RRH, thus creating a new network segment, named Midhaul.
 - b. Network cloudification is useful to bring functions in remote locations. Cloud RAN exploits NVF and cloudification by virtualizing the BBU functionalities.
 - c. Cloudification is a virtualization process that enables mobile edge computing and network slicing. Unfortunately, new challenges arise with cloudification such as grooming issues, security matters, and limitations in cell interworking.
 - d. Cloudification of network functions allows a lower TCO by enabling infrastructure sharing (by different operators), multiple service providers coexistence in the same network, and the usage of one single shared CPRI instance which ultimately reduces the bandwidth requirements.
14. Which of the following is one of the possible options for Fronthaul, Midhaul, and Backhaul implementation?
 - a. VWM is suitable for point-to-point links while the packet aggregation and optical-transport functions are supported by PSS and TPS products.
 - b. Fronthaul can be implemented using rings or linear chains with a maximum length of 35 to 40km by leveraging on IP-based solutions.
 - c. The Midhaul can be based on optical channel switching (PSS) and can cover distances of up to about 800km (non repeated).
 - d. While Midhaul and Backhaul are always based on optical links, Fronthaul is typically supported by radio (microwave) links.
15. Which of the following is true about CPRI protocol?
 - a. CPRI defines an I/Q data interface for various standards such as LTE, WCDMA, GSM, etc.
 - b. CPRI uses a physical connection for user data and management. Instead, control signaling and synchronization are based on a different physical connection.
 - c. CPRI is circuit switched. It leverages on a dedicated path and reserved bandwidth. Low bandwidth is required for CPRI and therefore, it became popular in Fronthaul networks.
 - d. Despite the fact that CPRI uses a lot of bandwidth, one single CPRI stream can support several I/Q data flows to several different radios. That is, if multiple cells/sectors have been deployed in the same area, only one single CPRI flow is necessary to serve them.
16. Which components could be part of a VWM-based Fronthaul?
 - a. SAR-O, VWM, PMU/PMUD21, SMM, OSU, TLU-9/9M, and ITP.
 - b. SAR-O, VWM, CMU/CMUD21, SMD, PSU, TLU-9/9M, and ITP-4.
 - c. SARC-O, VWM, PMU/PMUD21, SMD, PSU, TLU-9/9M, and ITP.
 - d. SARC-O, VWM, PMU/PMUD21, SMD, OSU, TLU-9/9M, and ITP-4.
17. Which of the following statements is correct about the PMU and TLU units?
 - a. PMU is completely passive while TLU is active. If the power feed is removed, the traffic is lost.
 - b. PMU needs power to support some features such as OSC, inventory monitoring, and peer channel power measurements while TLU always require power to work.
 - c. PMUD21 unit supports DWDM muxing capabilities and can scale up to 184 channels. If PMUD21 unit is used instead of PMU, the new version of TLU (i.e., TLUD21) must be configured to enable all channels.
 - d. IPT integrates together PMU and TLU and is passive.

18. What topics are related with an Ethernet-based Fronthaul?
- a. Ethernet doesn't scale well because of lack of WDM support. Therefore, it can be used for small cells only where the bandwidth required is not too huge.
 - b. Ethernet for Fronthaul is not easy to implement because of synchronization issues. So far, no standard is available to manage synchronization over Ethernet.
 - c. Ethernet supports any network topology and cell-traffic multiplexing. Ethernet installation is fast, simple, and robust, and allows a smooth evolution towards leveraging data centers and cloud.
 - d. Ethernet for Fronthaul can be implemented thanks to protocols such as SyncE, 1588v2 (PTP), and 802.1CM that help with traffic protection and resiliency.
19. Which network infrastructures can support Fronthaul?
- a. Ethernet, microwave, passive WDM, semi-passive WDM, active-transparent WDM, and active-framed OTN.
 - b. Ethernet, dedicated fiber, microwave, passive WDM, semi-passive WDM, active-transparent WDM, and active-framed OTN.
 - c. Ethernet, microwave, passive WDM, semi-passive WDM, active-transparent WDM, and OTN-framed passive WDM.
 - d. Ethernet, dedicated fiber, microwave, passive WDM, semi-passive WDM, active-transparent WDM, and OTN-framed passive WDM.
20. Which of the following statements is correct about OSU?
- a. The OPS doesn't support remote inventory while the OSM does.
 - b. The OPS is a device able to detect fiber fault. OSM, then triggered by the OSU, performs the traffic switch.
 - c. The OPS is the pack within the OSM module that is able to switch traffic based on predefined switching criteria.
 - d. The OPS is made of several components: up to four OSMs, one EMU, and up to two PSUs.



Answer Key

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|-------|-------|
| 1. A | 11. B |
| 2. B | 12. D |
| 3. A | 13. B |
| 4. C | 14. A |
| 5. A | 15. A |
| 6. D | 16. A |
| 7. A | 17. B |
| 8. C | 18. C |
| 9. D | 19. B |
| 10. A | 20. D |

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