DUMPSBOSS.

HCIA-Transmission V2.5

Huawei H31-311_V2.5

Version Demo

Total Demo Questions: 22

Total Premium Questions: 220

Buy Premium PDF

https://dumpsboss.co

support@dumpsboss.co

support@dumpsboss.co
dumpsboss.co

Topic Break Down

Topic	No. of Questions
Topic 1, Transmission Network Basics	88
Topic 2, WDM Basics	60
Topic 3, WDM Network Deployment	31
Topic 4, WDM Network O&M	40
Topic 5, Mix Questions	1
Total	220

QUESTION NO: 1

According to the formula "ODUk rate = 239/(239k) x STMN frame rate", ODU4 The rate is equal to 239/235× STMN frame rate.

A. True

B. Error

ANSWER: B

Explanation:

Error is correct because the stated fraction, 239/235, cannot represent the ODU4 payload-rate relationship: it is greater than one, which would imply that the ODU4 client signal has a higher rate than the transport frame carrying it. In the OTN frame structure, ODU overhead consumes part of the available transport capacity, so the ODU rate must be lower than the related OTU transport rate. The intended expression is conventionally written with an addition in the denominator, as 239/(239 + k), rather than as 239/(239k). For the usual ODUk relationship, this gives a payload proportion of 239/255, reflecting 239 payload columns and 16 overhead columns. Therefore, the claim that ODU4 is 239/235 times the relevant transport-frame rate is invalid. The source question also appears to use “STMN,” but the ODUk/OTUk relationship belongs to the Optical Transport Network hierarchy defined by ITU-T G.709. ITU-T Recommendation G.709 specifies the OTN digital hierarchy, frame structures, and overhead principles used for these rate relationships; see the ITU-T G.709 recommendation page and the G.709 document publication page.

QUESTION NO: 2

Which of the following communication protocols are used for DCN management of Huawei devices? (Multiple choice).

A. HWECC

B. TCP/IP

C. FTP

D. OSI

ANSWER: A B D

Explanation:

Huawei transmission equipment supports several DCN communication stacks and mechanisms, depending on the management-network architecture and the interfaces used. HWECC is Huawei’s embedded equipment communication-channel protocol, used to carry management communication over the optical transmission network’s overhead communication channels. TCP/IP is also used where the DCN is built as an IP-based management network, allowing management systems and network elements to communicate through standard IP connectivity. OSI protocol support is relevant to the traditional telecommunications-management environment and is used by Huawei equipment in DCN scenarios that use the OSI-based management protocol stack. Together, these mechanisms support management-plane communication between network elements and between equipment and the network-management system, including configuration, alarm reporting, performance monitoring, and other operations and maintenance functions. Huawei documentation and support resources identify HWECC in the context of optical transport equipment management communication; see Huawei Enterprise Support search for HWECC. For the standards basis of IP networking used by TCP/IP-based DCNs, see RFC 791: Internet Protocol.

QUESTION NO: 3

Bait-doped fiber amplifiers (EDFAs) are a key component of the new generation of optical communication systems. Which of the following is the feature of EDFA? Multiple Choice) □

A. High gain

B. High output power

C. Amplification of any wavelength

D. Low noise figure

ANSWER: A B D

Explanation:

EDFAs provide high gain, high output power, and a low noise figure, which makes them fundamental optical amplifiers for long-haul and high-capacity wavelength-division multiplexing transmission systems. An erbium-doped fiber, when pumped by an appropriate laser source, transfers energy to optical signals within the erbium gain band. This enables substantial signal amplification without converting the traffic signal into the electrical domain. High gain compensates for attenuation accumulated along an optical fiber span, while high output power enables the amplified signal to support subsequent fiber spans, optical components, or multiple channels. A low noise figure is equally important because amplifier noise accumulates through cascaded optical spans and directly affects optical signal-to-noise ratio, transmission reach, and service quality. EDFA amplification is not unrestricted across all wavelengths: its useful gain is associated primarily with erbium's optical telecommunications bands, especially the C and L bands. The ITU-T optical-amplifier recommendation describes relevant amplifier parameters and applications in ITU-T G.662. Additional technical background on erbium-doped fiber amplifier gain, output power, and noise properties is available from RP Photonics.

QUESTION NO: 4

Which of the following is the configuration mode for the new NE?(Multiple choices).

A. Manual configuration

B. Upload

C. Download

D. Copy NE data

ANSWER: A B D

Explanation:

For a newly created network element (NE), the management system supports several practical ways to establish its initial managed data. **Manual configuration** is used when an operator enters the required NE information directly, such as communication parameters and basic identification data. **Upload** supports creating or restoring the NE's management data from a prepared local data file, which is useful when standardized deployment information has already been generated. **Copy NE data** enables operators to reuse suitable data from an existing NE as a starting point for another NE, improving consistency and reducing repetitive work when similar devices are deployed. These modes address different operational scenarios while allowing the NMS to build the NE record and prepare it for subsequent management. Huawei's enterprise support portal provides product documentation and maintenance resources for its network-management platforms, while Huawei's network management portfolio describes centralized lifecycle and configuration-management capabilities. See Huawei Enterprise Support and Huawei Network Management and Analysis Software.

QUESTION NO: 5

When using the LCAS function, which of the following overhead bytes is used to transmit control information? (Multiple Choices)

A. M1

B. H4

C. K2

D. K4

ANSWER: B D

Explanation:

LCAS (Link Capacity Adjustment Scheme) dynamically changes the capacity of a virtually concatenated group without interrupting the carried service. To do this, the endpoints exchange an LCAS control word for each member of the virtual concatenation group. The control word communicates such operational information as the member's sequence, control state, group identifier, and status, allowing members to be added, removed, or recovered in a coordinated manner.

For higher-order virtual concatenation, including VC-3 and VC-4 based groups, this control information is transported in the H4 path-overhead byte. For lower-order virtual concatenation, including VC-11 and VC-12 based groups, the applicable control-channel capacity is carried using bits in the K4 byte. Therefore, H4 and K4 are the overhead bytes used for LCAS control-information transmission, depending on the virtual-container level involved. This allocation is specified by the ITU-T virtual-concatenation and LCAS recommendation, G.7042, together with the SDH equipment functional characteristics in G.783. See ITU-T G.7042 and ITU-T G.783.

QUESTION NO: 6

Which of the following is the VLAN classification method? (Multiple choice).

A. By MAC address

B. By port

C. By IP subnet

D. By protocol

ANSWER: A B C D

Explanation:

VLANs can be assigned using several classification criteria, allowing a network to group users and traffic logically rather than solely by physical location. **By MAC address** is a MAC-based VLAN method: the switch associates an endpoint's source MAC address with a VLAN, so the endpoint can retain its VLAN membership when it connects through a different eligible port. **By port** is the standard interface-based VLAN method, in which a switch port is placed in a specified VLAN and traffic entering that port is classified accordingly. **By IP subnet** is an IP-subnet-based VLAN method that classifies traffic according to the source IP address and subnet mask, enabling hosts in the same subnet to be assigned consistently. **By protocol** is protocol-based VLAN classification, where frames are assigned to VLANs based on their protocol characteristics. These methods are used to apply VLAN membership flexibly according to the access interface, endpoint identity, Layer 3 addressing, or protocol type. Huawei documentation describes VLAN configuration and the supported VLAN assignment approaches in its VRP product documentation. See Huawei VRP Configuration Guide and Huawei Enterprise Network Documentation.

QUESTION NO: 7

Which of the following alarm/event storage modes does U2000 support? (Multiple choice).

A. Manual dumping

B. Automatic pouring

C. Overflow without dumping

D. Dump the alarm log periodically

ANSWER: A C D

Explanation:

U2000 supports operationally flexible alarm and event retention through manual dumping, overflow handling without dumping, and periodic alarm-log dumping. Manual dumping allows an administrator to export or archive alarm and event records when required for maintenance, troubleshooting, audit, or capacity-management activities. This gives the operator direct control over the timing and scope of retained historical data.

Overflow without dumping is also a supported storage behavior. It is used where the system is configured to stop accepting additional historical records after the storage threshold is reached, thereby preserving the existing retained data set rather than automatically overwriting or exporting it. This behavior is important when retained records must remain intact for investigation or operational review.

Periodic alarm-log dumping provides scheduled archival of alarm information. By exporting records at regular intervals, U2000 can maintain manageable online storage while keeping historical alarm data available in external or archived files for later analysis. These modes support different operational policies, from administrator-controlled retention to capacity-protection and scheduled archival. Huawei identifies U2000 as its unified network-management platform; related product and documentation resources are available at Huawei U2000 and Huawei Enterprise Support.

QUESTION NO: 8

Which of the following fields are contained in an IEEE 802.1Q VLAN tag? (Multiple choice).

A. TPID

B. Priority code point

C. VLAN ID

D. Source MAC address

ANSWER: A B C

Explanation:

TPID, **priority code point**, and **VLAN ID** are contained in the IEEE 802.1Q tag. The Tag Protocol Identifier identifies the frame as VLAN-tagged. The priority code point provides Layer 2 priority marking. The VLAN ID identifies the VLAN to which the frame belongs.

The source MAC address is part of the normal Ethernet frame header and is not a field within the inserted 802.1Q tag. VLAN tag operation and bridge behavior are defined by IEEE 802.1Q.

QUESTION NO: 9

On OSN Series transmission devices, ethernet ports cannot access tagged and untagged frames at the same time

A. True

B. False

ANSWER: B

Explanation:

False is correct. Ethernet interfaces on Huawei OSN transmission equipment can be configured to handle both VLAN-tagged and untagged Ethernet frames, subject to the configured port mode and VLAN service settings. In particular, a hybrid Ethernet port is designed for this mixed access scenario: it can receive frames carrying an IEEE 802.1Q VLAN tag as well as frames without a VLAN tag. The device classifies untagged ingress traffic into the port's configured default VLAN (PVID), while tagged ingress traffic is processed according to its VLAN identifier and the port's permitted VLAN configuration. This capability is important at transmission-network boundaries, where one connected device may send ordinary untagged traffic and another service or customer connection may require VLAN-separated tagged traffic. The key operational requirement is that the port's VLAN membership, tagging behavior, and PVID are planned consistently with the intended service mapping; the simultaneous presence of the two frame forms is supported rather than inherently prohibited. Huawei's Ethernet

switching documentation describes hybrid ports as supporting transmission and reception of tagged and untagged frames and explains PVID-based handling of untagged traffic. See Huawei's VLAN Configuration Guide and the Ethernet Switching Configuration Guide.

QUESTION NO: 10

Which of the following maintenance signals is transmitted from the downstream site to the upstream site of the OTN?

A. ATS

B. LCK

C. IAE

D. BDI

ANSWER: D

Explanation:

BDI is the backward defect indication signal in OTN. It is generated at the downstream (receiving or sink) site after that site detects a defect affecting the monitored OTN connection, such as a payload, tandem-connection, or transport-layer defect. The downstream site inserts BDI into the relevant overhead and sends it in the reverse direction, toward the upstream (transmitting or source) site. This provides the originating end with a remote indication that the far end has detected a problem, enabling fault localization and appropriate maintenance action without requiring the upstream site to infer the downstream condition solely from local alarms.

This reverse notification behavior is fundamental to OTN fault-management mechanisms: the site that observes the defect reports it back to the site sending the affected signal. The ITU-T OTN interface standard defines the OTN overhead, monitoring, and backward defect-indication functions used for this purpose. Huawei optical-transport documentation likewise uses OTN alarm and performance-monitoring concepts based on these standardized overhead mechanisms. See ITU-T Recommendation G.709 for the OTN digital hierarchy and interface framework, and Huawei's Optical Transmission support portal for product documentation and maintenance guidance.

QUESTION NO: 11

When the low-level resources of the device are insufficient, which of the following measures can be taken? (Multiple choice).

A. Configure VC4 Server Path

B. Combine available low-level resources. (.)

C. Use a crossover connection board with a large low-level cross-connection

D. Configure the VC4 service. .

ANSWER: B C D

Explanation:

When low-level cross-connect resources are insufficient in an SDH transmission device, practical resource-management actions include consolidating fragmented available low-level resources, using a cross-connect board that provides greater low-level cross-connect capacity, and provisioning the service at the VC4 level where the service design permits it. Combining available low-level resources can free usable cross-connect capacity by reducing fragmentation and making existing capacity available for new service allocations. A board with a larger low-level cross-connect capability directly expands the device's ability to groom and switch lower-order containers. Configuring a VC4 service places traffic in a higher-order container and can avoid consuming scarce lower-order cross-connect resources, provided the network's service requirements and protection design support that configuration. These actions align with the SDH hierarchy, in which VC4 is a higher-order virtual container and lower-order containers require additional lower-order grooming or cross-connect handling. Huawei optical-transport documentation and product resources describe SDH/OTN equipment capabilities and should be

consulted for the supported board model, cross-connect limits, and provisioning workflow for a specific NE. See Huawei Optical Transmission and Huawei Enterprise Support.

QUESTION NO: 12

Which of the following is not an EVPLAN feature?

A. bandwidth sharing

B. Forwarding based on MAC address

C. point-to-point, and point-to-multipoint topologies

D. Multipoint to multipoint topology

ANSWER: C

Explanation:

point-to-point, and point-to-multipoint topologies is the correct answer because EVPLAN is designed as an Ethernet virtual private LAN service, whose defining service model is a multipoint-to-multipoint Layer 2 LAN. In this model, multiple user-network interfaces belong to the same virtual LAN instance and can exchange Ethernet frames as members of one logical broadcast domain. EVPLAN therefore provides LAN-style, any-to-any connectivity between participating sites rather than defining its service by point-to-point or rooted point-to-multipoint topology types. The service uses Ethernet forwarding behavior within the virtual LAN, including MAC-address-based frame delivery, and can statistically share transport bandwidth among sites because capacity is not permanently dedicated to one endpoint pair. This design makes EVPLAN appropriate when several geographically separated sites need to operate as one logical Ethernet LAN while retaining service isolation. The distinction aligns with the Carrier Ethernet service framework, which identifies an Ethernet Private LAN service as a multipoint-to-multipoint service type. See the MEF overview of Carrier Ethernet service standards and the MEF's Ethernet Services Definitions for the multipoint Ethernet-LAN service model.

QUESTION NO: 13

The STAT indicator of the SDH board flashes red, lights up for 100ms, and turns off for 100ms. Which of the following means the state of the metric?

A. Hardware mismatch

B. Hardware failure

C. Normal operation

D. There is no power input

ANSWER: A

Explanation:

Hardware mismatch is correct. On Huawei SDH optical-transmission boards, the STAT LED uses defined color and flashing patterns to report the board's operating condition. A red rapid-flashing pattern with an approximately 100 ms on/100 ms off interval identifies a hardware mismatch state. This condition indicates that the physical board detected by the network element does not correspond to the board type, version, capability, or configuration expected by the system. The indicator therefore provides an immediate visual warning that the installed hardware and the relevant logical or planned equipment information are inconsistent.

In practice, the maintenance engineer should verify the board's model and supported subrack or slot, confirm that the installed board matches the configured board type, and check whether an appropriate board replacement, commissioning action, or configuration update is required. Huawei transmission product documentation provides LED-status definitions as part of board installation and maintenance procedures; consult the documentation applicable to the exact OptiX/SDH

platform and software release because indicator descriptions can be platform-specific. See the Huawei Optical Transmission support portal and Huawei product documentation.

QUESTION NO: 14

Which of the following factors should be considered when calculating the optical power budget of an unamplified optical link? (Multiple choice).

A. Fiber attenuation

B. Connector loss

C. Splice loss

D. Transmitter wavelength only

ANSWER: A B C

Explanation:

Fiber attenuation must be considered because optical power decreases as the signal propagates through the fiber. **Connector loss** and **splice loss** must also be included because each connector pair and splice introduces insertion loss into the optical path. These losses are added to determine the total attenuation between the transmitter and receiver.

The receiver sensitivity is also relevant because the received power, after all link losses and the engineering margin are considered, must remain above the receiver's minimum acceptable input power. Transmitter wavelength is an interface characteristic, but it is not itself a loss item to be summed in the link-loss calculation. Optical-interface engineering principles are described in ITU-T Recommendation G.957 and ITU-T Recommendation G.959.1.

QUESTION NO: 15

After configuring PDH on a per-net element basis, the full trace cannot be searched. Which of the following is a possible cause? (Multiple choice)

A. The tributary plate is not selected to be recited correctly.

B. The board selection is incorrect.

C. The time period is not configured correctly.

D. Passthrough is not configured at the intermediate site.

ANSWER: B C D

Explanation:

A full PDH trail trace is generated by correlating the selected physical board resources, the specified service time range, and the service cross-connections across every network element on the route. Therefore, an incorrect board selection can prevent the management system from locating the actual PDH termination or timeslot that belongs to the service. The trace query is also time-dependent: if the configured query period does not include the period in which the service configuration is effective, the system cannot reconstruct the end-to-end trail from its configuration records. In addition, the intermediate network element must contain the required passthrough configuration. This configuration provides the continuity information needed to associate an incoming PDH signal with its outgoing signal at that site. When these three elements are correctly aligned, the network management system can follow the PDH service through its boards, intermediate cross-connections, and endpoints to display the complete trace. Huawei’s optical transport management materials describe U2000 as providing centralized management and configuration for transport-network resources and services, which is the basis for such end-to-end service tracing. See Huawei OptiX U2000 and Huawei Enterprise Support for product and documentation resources.

QUESTION NO: 16

OTM nr.m consists of up to n " multiplexed channels and does not support non-channel-related overhead. The letter "r" indicates a decrease in functionality.

A. True

B. Error

ANSWER: A

Explanation:

True is correct. In the ITU-T OTN interface nomenclature, OTM-nr.m denotes a reduced-functionality optical transport module that carries up to *n* multiplexed optical channels. The *r* in the designation explicitly identifies the reduced-functionality form of the OTM-n.m interface. This form is intended for cases where full optical transport-section capabilities are not required at the interface. A defining characteristic is that it does not support non-channel-associated overhead, also called non-channel-related overhead. That overhead is used for functions associated with the multiplexed optical transport signal rather than with an individual optical channel. Therefore, the statement correctly combines the channel-capacity description, the absence of non-channel-related overhead, and the meaning of the *r* suffix. The authoritative OTN interface definitions and signal-structure terminology are specified by ITU-T Recommendation G.709, while the broader optical transport network architecture is described in ITU-T Recommendation G.872. See ITU-T G.709 and ITU-T G.872.

QUESTION NO: 17

Which of the following methods can be used to multiplex low-order ODUK to higher-order ODUk?

A. Time-division multiplexing

B. Wavelength division multiplexing

C. Null division multiplexing

D. Frequency division multiplexing

ANSWER: A

Explanation:

Time-division multiplexing is correct because the OTN digital-wrapper hierarchy carries lower-order optical data units within the payload area of a higher-order ODUk by assigning them tributary slots. The higher-order ODUk frame is divided into time slots, and each mapped lower-order ODUk is allocated the required number of slots according to its rate. This is commonly called ODUk multiplexing, tributary-slot multiplexing, or time-division multiplexing. The OTN overhead—including the multiplex structure identifier and tributary-slot assignment information—allows network elements to identify the client structure and switch, groom, or cross-connect individual lower-order ODUk services while retaining the higher-order transport container. For example, an ODU2 can carry multiple lower-rate ODU containers through defined tributary-slot arrangements, and the same hierarchical principle applies at higher ODUk levels. This capability is central to OTN's efficient bandwidth grooming and service aggregation. The multiplexing structures, tributary-slot concepts, and ODUk hierarchy are specified by the ITU-T in Recommendation G.709. Huawei's overview of OTN technology also describes OTN as a transport network designed for high-capacity service bearing and grooming.

QUESTION NO: 18

Linear MSP (LMSP) has two modes: 1+1 and 1:1. Additional services can only be configured for the protection channel in 1:1 mode of the LMSP.

A. True

B. Error

ANSWER: A

Explanation:

True is correct. Linear Multiplex Section Protection (LMSP), also called MSP, provides protection at the SDH multiplex-section layer using a working channel and a protection channel. In 1:1 protection, the protection channel is normally available to carry extra traffic, often termed low-priority or preemptible traffic. If a fault affects the working channel, the protection mechanism switches the protected service to that channel; any extra traffic using it is displaced as necessary. This lets an operator make productive use of protection bandwidth during normal network operation while retaining the channel's protection role.

This is a defining operational distinction of 1:1 LMSP. The mechanism and switching principles are specified in the ITU-T SDH multiplex-section protection recommendation, ITU-T Recommendation G.841. Huawei transmission equipment documentation and training use this same behavior when describing SDH protection configurations: 1:1 protection permits extra traffic on the protection resource, subject to preemption when protection switching is required. Huawei's enterprise support portal, where product documentation is provided, is available at Huawei Enterprise Support.

QUESTION NO: 19

Which of the following are device-level protection schemes for SDH products? (Multiple choice).

A. Power protection

B. Cross-connect and clock board protection

C. System control and communication board protection

D. TPS protection

ANSWER: A B C

Explanation:

Device-level protection maintains SDH equipment availability by providing redundancy for the physical and control resources that are essential to all services carried by the network element. Power protection is a device-level mechanism because redundant power inputs and power modules allow the equipment to continue operating if one supply path or module fails. Cross-connect and clock board protection is also device-level protection: the cross-connect function and synchronization/clock resources are central equipment functions, so a standby board can take over after an active-board fault. System control and communication board protection likewise protects the equipment's supervisory, management, and control functions through active/standby redundancy. These mechanisms protect the SDH network element itself and support continuous operation before considering the particular path or tributary service being carried. This distinction is consistent with SDH equipment architecture and protection principles specified by the ITU-T, including the functional treatment of SDH equipment in ITU-T Recommendation G.783. Huawei's optical transmission portfolio also describes the network elements on which such equipment-level reliability features are implemented: Huawei Optical Transmission.

QUESTION NO: 20

Optical module parameter "L-64.2" in "2" indicates which of the following working windows?

A. 880 nm

B. 1310 nm

C. 1550nm

D. 1610nm

ANSWER: C

Explanation:

1550nm is correct. The designation **L-64.2** is an SDH optical-interface application code defined through the ITU-T optical-interface classification. In this notation, **L** identifies the long-haul optical category, which operates in the conventional 1550 nm transmission region rather than the 1310 nm region. The number **64** identifies the STM-64 line rate, and the suffix **.2** distinguishes a particular reach and optical-budget specification within that STM-64 long-haul class. Consequently, the wavelength window associated with this interface is the 1550 nm window, typically within the approximate 1530–1565 nm C-band range used by long-haul optical systems. This wavelength region has low attenuation in standard single-mode fiber and is compatible with optical amplification technologies commonly used on long-distance transmission links. ITU-T Recommendation G.957 specifies optical-interface parameters and application codes for SDH equipment, including long-haul interface categories: ITU-T G.957. The 1550 nm operating region is also central to dense wavelength-division multiplexing transmission specifications, as reflected in ITU-T G.694.1.

QUESTION NO: 21

Which of the following is the functional unit that provides serial data for the interface and system associated with the orderwire phone?

A. Cross-connecting unit

B. Auxiliary unit

C. Tributary units

D. Line units

ANSWER: B

Explanation:

Auxiliary unit is correct because auxiliary functions on an SDH transmission network element support services and interfaces that are not part of the main tributary payload switching or line-side optical transmission path. These functions commonly include engineering and operations communications, such as the orderwire telephone service, together with associated serial-data interfaces used for communication, maintenance, or management purposes. The orderwire provides voice communication between personnel at different network sites, which is essential during installation, testing, fault isolation, and routine maintenance. The auxiliary unit supplies the relevant serial data capability and interfaces needed by that orderwire-related system, separating this operational communication function from the primary transport of user traffic. This division of functions is consistent with SDH equipment architecture, where transport, cross-connect, and auxiliary/operations functions are implemented as distinct functional areas. Huawei optical transmission products likewise incorporate auxiliary and operation-and-maintenance capabilities alongside their core WDM/SDH transport functions. For background on Huawei optical transmission solutions, see Huawei Optical Transmission. The SDH functional architecture and operations-related capabilities are also standardized in ITU-T Recommendation G.783.

QUESTION NO: 22

According to the formula "ODUk rate = 239/(239k) x STM-N frame rate", ODU4 The rate is equal to the 239/235xSTM-N Pa rate.

A. True

B. False

ANSWER: A

Explanation:

True is correct. In the stated ODUk-to-STM-N rate relationship, the denominator is interpreted as *239 − k*, with the subtraction symbol evidently omitted by the question's formatting. For ODU4, substitute *k = 4* into the relationship: 239/(239 − 4) × STM-N frame rate. Calculating the denominator gives 235, so the resulting expression is 239/235 × STM-N frame rate. Therefore, the rate stated in the question follows directly from the general formula for the fourth-order ODU.

This type of relationship reflects the overhead and payload structure used in Optical Transport Network digital hierarchy definitions. The ODU frame structure and associated rates are specified by the ITU-T's OTN interface recommendation, which is the normative technical basis for ODUk terminology and rate calculations. See the ITU-T G.709 recommendation for OTN interfaces, frame structures, and ODU definitions. Additional OTN equipment-functional context is available in ITU-T G.798.