Question 1

What is the maximum number of PCIs supported by a 5G network?

Options:

A- 1008

B- 512

C- 768

D- 384

Answer:

A

Explanation:

https://www.5gworldpro.com/blog/2020/11/11/what-is-difference-between-pci-in-4g-lte-and-pci-in-5g-nr/

The maximum number of PCIs (Physical Cell Identifiers) supported by a 5G network is 1008. This is specified in 3GPP 5G standard TS 38.211, which states that the maximum number of PCIs that a 5G network can support is 1008.

In 5G, each cell is assigned a unique identifier called the PCI (Physical Cell Identity). The PCI is used to identify the cell and its system information, and it is used for various purposes such as cell selection, handover, and interference management.

According to 3GPP specifications, the maximum number of PCIs that can be supported by a 5G network is 1008, which allows for a large number of cells to be deployed in a network. However, the actual number of PCIs used in a network will depend on the specific deployment scenario, the network architecture, and the capacity requirements of the network.

Question 2

Question Type: **MultipleChoice**

Which of the following functions are implemented by the UBBP board in the BBU5900? (Choose all that Apply)

Options:

A- Provides CPRI ports for communication with RF modules.

B- Manages the configuration and devices for the base station.

C- Monitors performance and processes signals for the base station.

D- Processes uplink and downlink baseband signals.

Answer:

A, D

Explanation:

1. The UBBP board in the BBU5900 provides CPRI (Common Public Radio Interface) ports for communication with RF (Radio Frequency) modules. CPRI is an interface standard that is used to transfer baseband signal data between the BBU and the RF modules. D. The UBBP board also processes uplink and downlink baseband signals. This includes signal demodulation, decoding, and modulation, as well as error correction, signal filtering, and other signal processing functions.

Question 3

Question Type: MultipleChoice

Which type of information about NR cells is carried in the neighboring NR cell MRs reported by UEs? (Choose all that Apply)

Options:

A- RSRP

B- MACCE

C- PCI

D- TA

Answer:

A, C

Explanation:

1. RSRP (Reference Signal Received Power) is the power level of the reference signals received from the cell, it is used to measure the strength of the signal from the cell, and it is an important parameter for cell selection and handover decisions. C. PCI (Physical Cell Identity) is a unique identifier assigned to each cell in the network, it is used to identify the cell and its system information.

Question 4

Question Type: **MultipleChoice**

Which of the following actions are involved in NAS procedure management in 5G? (Choose all that Apply)

Options:

A- Registration management

B- RRC reestablishment

C- Session management

D- RRC connection setup

Answer:

A, C, D

Explanation:

NAS (Non-Access Stratum) procedure management in 5G involves three specific actions: registration management, session management, and RRC connection setup. Registration management involves sending and receiving of NAS messages related to the establishment of user-network connections, such as attach and detach procedures. Session management involves sending and receiving of NAS messages related to the management of user session related information, such as security context management. RRC connection setup involves sending and receiving of NAS messages related to the establishment, modification, and release of RRC connections. RRC reestablishment is not involved in NAS procedure management in 5G.

https://www.etsi.org/deliver/etsi_ts/138300_138399/138331/15.02.01_60/ts_138331v150201p.pdf

TS 138 331 - V15.2.1 - 5G; NR; Radio Resource Control (RRC ...

https://www.etsi.org/deliver/etsi_ts/138300_138399/138331/15.02.01_60/ts_138331v150201p.pdf

https://scdn.rohde-schwarz.com/ur/pws/dl_downloads/dl_application/application_notes/1sl/1SL368_0e_5G_NR_UE_RF_conformance_38.521-3.pdf

5g nr fr1 non-standalone ue rf conformance testing

https://scdn.rohde-schwarz.com/ur/pws/dl_downloads/dl_application/application_notes/1sl/1SL368_0e_5G_NR_UE_RF_conformance_38.521-3.pdf

https://www.etsi.org/deliver/etsi_ts/138300_138399/138331/15.03.00_60/ts_138331v150300p.pdf

TS 138 331 - V15.3.0 - 5G; NR; Radio Resource Control (RRC ...

https://www.etsi.org/deliver/etsi_ts/138300_138399/138331/15.03.00_60/ts_138331v150300p.pdf

Question 5

Question Type: MultipleChoice

According to 3GPP specifications, which of the following is not an RRC state in 5G?

Options:

A- RRC_IDLE

B- RRC_ACTIVE

C- RRC_CONNECTED

D- RRC_INACTIVE

Answer:

D

Explanation:

According to 3GPP specifications, the RRC states in 5G are RRCIDLE, RRCACTIVE, and RRCCONNECTED. RRCINACTIVE is not an RRC state defined in 3GPP specifications. RRCIDLE is the state when the UE is not attached to an eNB and is not actively monitoring for paging. RRCACTIVE is the state when the UE is attached to an eNB and is actively monitoring for paging. RRCCONNECTED is the state when the UE has an established RRC connection with an eNB.

The RRC is a protocol that controls the radio resources of the mobile device in a cellular network. 3GPP (3rd Generation Partnership Project) has defined several RRC states for 5G NR (New Radio) to manage the radio resources of the mobile device. These states are:

1. RRC_IDLE: The mobile device is not connected to any cell and is not actively searching for a cell to connect to. B. RRC_ACTIVE: The mobile device is connected to a cell and is actively communicating with it. C. RRC_CONNECTED: The mobile device is connected to a

cell, but it's not actively communicating with it. It is in a low power state and is only listening to the paging channel for incoming calls or data.

So, the correct answer is D. RRC_INACTIVE, is not an RRC state in 5G according to 3GPP specifications. It's worth noting that the RRC state of the mobile device can change dynamically based on the network conditions, service requirements, and the mobile device's power management.

Question 6

Question Type: MultipleChoice

At which layer is downlink data split implemented over the NR air interface in the NSA Option 3x architecture?

Options:

A- RLC layer

B- MAC layer

C- PDCP layer

D- Physical layer

Answer:

B

Explanation:

Downlink data split over the NR air interface in the NSA Option 3x architecture is implemented at the medium access control (MAC) layer. The MAC layer is responsible for the management of data transmission over the air interface, including segmentation and reassembly of data packets, scheduling of transmission resources, and error correction. The other layers (RLC, PDCP, and physical) are not involved in the implementation of downlink data split.

https://ec.europa.eu/research/participants/documents/downloadPublic?documentIds=080166e5a964aa85&appId=PPGMS

Preliminary results for multi-service support in link solution adaptation

https://ec.europa.eu/research/participants/documents/downloadPublic?documentIds=080166e5a964aa85&appId=PPGMS

https://ieeexplore.ieee.org/iel7/6287639/8948470/08998153.pdf

3GPP NR Sidelink Transmissions Toward 5G V2X

https://ieeexplore.ieee.org/iel7/6287639/8948470/08998153.pdf

https://www.3gpp.org/ftp/Inbox/Marcoms/ICT_6_1-2.pdf

journal of ict standardization - 3gpp

https://www.3gpp.org/ftp/Inbox/Marcoms/ICT_6_1-2.pdf

In the Non-Stand-Alone (NSA) Option 3x architecture, the control plane functions are handled by the 4G LTE network (EPC), while the user plane functions are handled by the 5G NR network. Data split is a technique that allows to split the user plane data between the 4G LTE and 5G NR networks.

The MAC (Medium Access Control) layer is responsible for controlling the access to the shared wireless medium, and it is where the downlink data split is implemented. In this architecture, the MAC layer in the 5G NR network receives the downlink data from the 4G LTE network and sends it to the physical layer for transmission.

Question 7

Question Type: **MultipleChoice**

Which of the following channels (signals) can be used for cell measurement in NR?

Options:

A- DM-RS

B- CSI-RS

C- PT-RS

D- SSB

Answer:

A, B

Explanation:

1. DM-RS (Demodulation Reference Signals) are transmitted in the frequency domain, they are used to demodulate the downlink data and control channels, and they can be used for cell measurement such as cell identification, cell reselection, and handover. B. CSI-RS (Channel State Information Reference Signals) are also transmitted in the frequency domain, they are used to provide channel state information for downlink data and control channels, and they can be used for cell measurement such as link adaptation, beamforming and interference management.

DM-RS stands for Demodulation Reference Signal and is used for channel estimation in the frequency domain. CSI-RS stands for Channel State Information Reference Signal and is used for channel estimation in the time-frequency domain. PT-RS and SSB are not channels (signals) that can be used for cell measurement in NR.

Question 8

Question Type: **MultipleChoice**

Which of the following NR slot configurations are defined in 3GPP specifications? (Choose All that Apply)

Options:

A- Mixed slot, which contains at least one downlink/uplink symbol while other symbols can be flexibly configured

B- Flexible-slot (all symbols are flexibly configured)

C- Downlink-only slot (all symbols are dedicated for downlink)

D- Uplink-only slot (all symbols are dedicated for uplink)

Answer:

A, B, C, D

Explanation:

1. Mixed slot is a slot configuration in which at least one downlink/uplink symbol is present, while other symbols can be flexibly configured for downlink or uplink transmission. This allows for a more efficient use of resources and better support for different types of services. B. Flexible-slot is a slot configuration in which all symbols are flexibly configured for downlink or uplink transmission. This allows for a more efficient use of resources and better support for different types of services. C. Downlink-only slot is a slot configuration in which all symbols are dedicated for downlink transmission, This configuration is mainly used for downlink-centric services such as video streaming or software downloads. D. Uplink-only slot is a slot configuration in which all symbols are dedicated for uplink transmission, this configuration is mainly used for uplink-centric services such as voice calls or video conferencing.

Question 9

SSB GSCN is the center frequency number of an NR cell.

Options:

A- True

B- False

Answer:

A

Explanation:

SSB GSCN is the center frequency number of an NR cell. SSB GSCN stands for 'SS block group-specific cell number' and is used to identify the center frequency of an NR cell. This value is used in combination with the operating bandwidth of the cell to determine the physical layer resource grid for the cell. As such, it is important for the correct SSB GSCN to be configured for the cell in order to ensure

the correct channel coding.

https://www.qualcomm.com/content/dam/qcomm-martech/dm-assets/documents/powerpoint_presentation_-_making_5g_nr_a_reality_february_2020_web.pdf

Making 5G NR a Commercial Reality A unified, more capable 5G air ...

https://www.qualcomm.com/content/dam/qcomm-martech/dm-assets/documents/powerpoint_presentation_-_making_5g_nr_a_reality_february_2020_web.pdf

https://www.gtigroup.org/d/file/Resources/rep/2019-07-05/cbf7810256b4c312c460863fcb77bd58.pdf

GTI 5G Device Power Consumption White Paper

https://www.gtigroup.org/d/file/Resources/rep/2019-07-05/cbf7810256b4c312c460863fcb77bd58.pdf

In 5G NR, the SSB (Secondary Synchronization Signal Block) is used to provide the time and frequency synchronization information to the mobile devices. It is transmitted in the frequency domain and it consists of two parts: the SSB GSCN (Secondary Synchronization Signal Block - Group and Sequence Number) and the SSB MIB (Secondary Synchronization Signal Block - Master Information Block).

The SSB GSCN is a unique identifier that indicates the center frequency number of the cell. It is used to identify the cell and to determine the frequency offset of the cell with respect to the carrier frequency.

So, the statement is true, SSB GSCN is the center frequency number of an NR cell. It's worth noting that the SSB MIB contains other system information such as the system bandwidth, the transmission bandwidth configuration, and the number of symbols in a slot.

Question 10

Which of the following parameters is related to the frequency-domain position of PBCH DMRSs?

Options:

A- Cell ID

B- PCI

C- SI-RNTI

D- Bandwidth

Answer:

B

Explanation:

PCI (Physical Cell Identity) is related to the frequency-domain position of PBCH DMRSs (Physical Broadcast Channel Demodulation Reference Signals)

The PBCH DMRSs are used to demodulate the Physical Broadcast Channel (PBCH) which contains system information such as the cell identity, system bandwidth, and the downlink carrier frequency.

The PBCH DMRSs are transmitted in the frequency domain, and their position is determined by the Physical Cell Identity (PCI). The PCI is a unique identifier assigned to each cell in the network, and it's used to identify the cell and its system information.

So, the correct answer is B. PCI. It's worth noting that the other parameters you mentioned are also related to the 5G system information and the cell configuration. Cell ID is a unique identifier assigned to each cell, SI-RNTI (System Information RNTI) is a unique identifier assigned to the system information, and Bandwidth is the amount of frequency resources allocated to the cell.