

# Exam 2014/2015 Part 2

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## Question 1

A mobile call is initiated as follows:

- A connection and correspondent authentication is requested by the MS to BSS;
- Security checks are made to the HLR;
- Resources are requested to GMSC;
- A call is afterwards established by the MSC.

## Question 2

The standard 802.11ac is an evolution of the 802.11n. It has a number of different characteristics, such as only supporting 5GHz and supporting 256-QAM, therefore bigger bit rates. However, the biggest difference is the support for multi-user MIMO, which enables the AP to send data to multiple clients at the same time. Beam-forming is also supported for users in different locations.

## Question 3

**OLSR** stands for Optimized Link State Routing Protocol and is a pro-active protocol, which means that despite routes being always available, it uses significant network resources to maintain a continuous network control traffic. These messages are HELLO messages, meant to signal neighbours of their presence. It makes use of MPR to minimize traffic in the network.

MPR (MultiPoint Relays) are special nodes used to limit the number of nodes transmitting packets and reduce the number of duplicated transmissions.

Each node selects its MPR which must be at 1 hop distance. They must be minimum and enable communication with every 2-hop-away nodes.

## Question 4

### GSM to GPRS

The main objective was to simplify the access to the Internet and improve the network efficiency, achieved by adding packet switching to GSM, where data is transferred as packets.

Two new network elements were added\_

- SGSN, Serving GPRS Support Node, for authentication, switching, mobility and accounting.
- GGSN, Gateway GPRS Support Node, for IPv4/IPv6 internet routing.

### GPRS to UMTS

The main objective was to provide a standard way for personal communications to support large quantities of users. Makes use of WCDMA, where all users share the same time and frequency domain.

Two new components were added:

- UTRAN, Provides and manages the air radio interface for entire network.
- Core Network, Provides all management and central processing of the System (new Network switching subsystem).

## UMTS to HSPA

Routing Information Protocol

## HSPA to LTE

Routing Information Protocol

## Question 5

In Fast Handover in MIPv6 is a handover method where the MN finds about the new router (NAR) while still connected to the old router (PAR). The auto-configuration of the new CoA can be made while MN is associated with the PAR.

While the binding update for the nCoA (MIPv6, HomeAgent, CNs) is being performed, the MN can still be connected by using a tunnel between the NAR and PAR.