Case Study: Exploring Field Test Mode on Smartphones

Objective:

The goal of this case study is to explore and understand key networking information available on smartphones. By accessing the Field Test Mode on various devices (Android, iPhone, and Samsung), I will gather and analyze network-related data including IMEI, MAC address, IP address, signal strength, and other performance metrics to understand how mobile network parameters impact device connectivity and performance.

Device Types Covered:

Android Devices (General)
iPhone (iOS)
Samsung Devices (Specific Android Variant)

Key Information to Collect:

IMEI Number (International Mobile Equipment Identity)
MAC Address (Media Access Control Address)
IP Address (Internet Protocol Address)
Network Operator/Brand (Name of the Cellular Provider)
Network Type (4G LTE, 5G, etc.)
Signal Strength (Measured in dBm)
Download/Upload Bandwidth (Physical Channel Configuration and Speed)
Mobile Location Information (LAC - Location Area Code and CID - Cell ID)

1. Field Test Mode on Android Devices

Steps to Access Field Test Mode on Android:

To access the Field Test Mode on an Android device, follow these steps:

Open the dialer and enter the code: *#*#4636#*#* to access the Testing Menu.
From here, you can navigate to Phone Information to get details such as network type, signal strength, and IMEI number.
For Wi-Fi Information, tap the respective tab to gather data like IP address and MAC address.
Take screenshots of the network-related details, including IMEI number, network operator, signal strength, and type.

Key Information for Android Device:

IMEI Number: The IMEI is a unique 15-digit identifier for the mobile device. It helps in tracking stolen devices and also for verifying the authenticity of the device.
Network Type: For example, 4G LTE, 5G, or 3G. This indicates the technology the phone is using to connect to the network.
Signal Strength (in dBm): This indicates the strength of the signal received from the mobile network, with a value measured in negative dBm. A signal strength closer to 0 indicates a stronger signal.
Screenshot Example: [Include screenshot here from the Android device showing details like IMEI, network type, and signal strength.]

2. Field Test Mode on Samsung Devices

Steps to Access Service Mode on Samsung:

To access the service mode and diagnostic tools on a Samsung device:

Open the dialer and enter *#0011# to access Service Mode for detailed network information.
To check device hardware and other diagnostics, enter *#0*# to access the test screen.
In Service Mode, you can find network details such as signal strength, operator information, and the cell ID.

Key Information for Samsung Device:

IMEI Number: Similar to other devices, the IMEI number uniquely identifies the Samsung phone and is crucial for tracking and security purposes.

Network Operator/Brand: Shows the mobile operator providing the service (e.g., Verizon, AT&T, Vodafone).
Signal Strength: The dBm value that helps assess whether the device is receiving a strong or weak network signal.
Screenshot Example: [Include screenshot here from the Samsung device showing details like IMEI, network type, and signal strength.]

3. Field Test Mode on iPhone Devices
Steps to Access Field Test Mode on iPhone:
To access the Field Test Mode on an iPhone:

Open the phone dialer and enter *3001#12345#*, then press Call to enter Field Test Mode.
Navigate to the Serving Cell Info to check network details like signal strength, network type, and cell ID (CID).
You can also explore the Serving Cell Info to see more specific mobile location data such as the Location Area Code (LAC) and Cell ID.
Key Information for iPhone Device:
IMEI Number: The IMEI is used to identify the iPhone, ensuring that it’s authentic and registered with the correct network.
Network Type: It will display whether the iPhone is connected to 4G, 5G, or other network types, helping to understand the internet speed and coverage.
Signal Strength: Signal strength data helps determine the quality of the connection. The value is shown in negative dBm (e.g., -70 dBm) where closer to 0 represents stronger signal strength.
Screenshot Example: [Include screenshot here from the iPhone showing details like IMEI, network type, and signal strength.]

4. Explanation of Key Network Parameters
IMEI Number (International Mobile Equipment Identity):
The IMEI is a unique 15-digit number assigned to each mobile device. It is used by cellular networks to identify valid devices and helps track lost or stolen phones. It does not change and is used for security and troubleshooting.

MAC Address (Media Access Control Address):
The MAC address is a unique identifier assigned to the device's wireless network interface. It is used by routers and network systems to identify devices on a network. This can be important when managing Wi-Fi networks or for security purposes.

IP Address (Internet Protocol Address):
An IP address identifies the device on a network, allowing it to communicate with other devices over the internet. The IP address can either be public (assigned by an ISP) or private (used within a local network).

Network Operator/Brand:
This refers to the company providing the mobile network service (e.g., T-Mobile, Verizon, AT&T, Vodafone). It is crucial for identifying the network infrastructure and coverage a phone will have in different regions.

Network Type (e.g., 4G LTE, 5G, 3G):
The network type determines the mobile data speeds and overall connectivity experience. 4G LTE and 5G provide high-speed data transfer, while 3G or lower networks may result in slower internet speeds.

Signal Strength (Measured in dBm):

Signal strength is a measure of how strong the mobile network signal is at the device's location. The dBm value is negative, and a signal closer to 0 dBm indicates a stronger, more stable connection. Lower values (e.g., -110 dBm) can result in poor service or dropped calls.

Mobile Location Information (LAC and CID):
LAC (Location Area Code): This code represents the area or cell tower location within a mobile network.
CID (Cell ID): The unique identifier for a specific cell tower within a network. This information can be used for geolocation purposes.
5. Conclusion and Insights
The Field Test Mode is an essential tool for understanding how a smartphone interacts with cellular networks. By exploring the various network parameters, users can gain insights into the performance of their device, identify connectivity issues, and understand which network technologies are available in their area. Understanding parameters such as signal strength, network type, and IMEI number can help users troubleshoot network-related issues more effectively and ensure optimal device performance.

Screenshots:
Android Device Screenshot: [Insert screenshot here]
Samsung Device Screenshot: [Insert screenshot here]
iPhone Device Screenshot: [Insert screenshot here]
Submission:
Upload your final report along with screenshots to a private GitHub repository.
Share the GitHub repository link via Google Classroom for grading.
This should cover all aspects of the case study assignment. Make sure to add actual screenshots from your device when you go through the steps, and you can expand the explanation of any particular network parameter with your own observations. Let me know if you need further adjustments!