The information obtained from the SNYPER about the cellular environment is both comprehensive but also probably very daunting for many users. Different users will want to use different depths of the information provided. Whether viewed only on the SNYPER itself or on the files produced by the SNYPER, the information presented is consistent.

While many of the terms used are common to 2G, 3G and 4G networks, in many cases the range of values returned for any parameter can be different dependent on the generator of technology surveyed.

# 2G Survey Terms

## 3GPP

The 3rd Generation Partnership Project. The organisation responsible for maintaining the 2G cellular standards.

## Cellular Network

The mobile phone network which carries not only voice but also data. Often referred to as the GSM network or mobile network, GSM being the first digital mobile telephony network.

## EDGE

Enhanced Data rates for GSM Evolution. A packetized data implementation for the GSM network allowing data rates to 236.8 kBits/sec

## GPRS

General Packet Radio Services. A packetized data implementation for the GSM network allowing data rates to 85.6 kBits/s.

## GSM

Global System for Mobile Communications, the 2G cellular network.

## IMEI

International Mobile Equipment Identity. A 15 decimal digit number unique to the cellular device. Its structure is defined by 3GPP.

## ITU

International Telecommunication Union. A United Nations agency responsible for standardizing telecommunications. https://www.itu.int.

## Cell

All cells discovered in the survey are ranked by signal strength, where cell number 1 is the cell with the strongest signal, 2 is the next strongest, and so on.

## Index

This is a unique index number used by the SNYPER to identify a cell. Where the survey is a single survey, the cell number and index number are the same. With multiple surveys that the Index and the Cell numbers can be different as the order of strength of the cells can differ between surveys.

## Seen (Graphyte ONLY)

Applicable to all surveys where logging has been used. It is the count of how many times that the cell was seen, and (in brackets) what percentage of the surveys made that represents. There is usually (but not always) a good correlation between received signal strength and how many times that a cell is seen.

## ARFCN

This number defines the exact uplink and downlink frequencies used by the cell. It may be any number between 0 and 1023. This number may be looked up in the GSM standard to determine the exact radio frequencies used.

## dBm or AV dBm

The measured signal strength of the network in dBm. AV dBm is the average dBm of a multi-cycle survey.

| dBm | Signal Strength | Description |
|---|---|---|
| -80 dBm or lower | Excellent | Provides fast and reliable download/upload rates |
| -80 dBm to -90 dBm | Good | Medium download/upload rates with good reliability |
| -90 dBm to -100 dBm | Moderate | Low download/update rates with occasional dropouts |
| -100 dBm or higher | Unusable | Undetermined download/update rates with regular dropouts |

## % or AV %

This measurement is derived from the dBm measurement. It is the measured signal strength expressed as a percentage of the maximum possible signal strength which could be obtained. AV % is the average percentage of a multi-cycle survey.

## RSSI or AV RSSI

This measurement is derived from the dBm measurement. It is the Received Signal Strength Indication which is obtained by looking up the dBm measurement in a table in the GSM standard. AV RSSI is the average RSSI of a multi-cycle survey.

## MCC

Mobile Country Code. It identifies the country from which the network is originating. This should mean the country in which the base station is located. Unfortunately, there are some exceptions to this so it cannot always be used as a positive country indication. Typically used with the MNC to uniquely identify the network discovered.

## MNC

Mobile Network Code. This identifies the network operator in conjunction with the MCC. Some network operators such as Vodafone operate in many countries. It cannot be assumed that such network operators will have the same MNC in all countries in which they operate.

## LAI

Location Area Identification. Comprises the MCC, MNC and the LAC to uniquely define a geographical location.

## CellID

This is a number assigned to a base station cell by its operator. It may be any number between 0 and 65535. Within a survey this is likely to be a unique number, but nationally there is likely to be more than 65535 base stations meaning that the Cell ID number is not likely to be unique at the national level. However, when combined with the LAC a base station may be uniquely identified.

## LAC

Location Area Code. It may be any number between 1 and 65535, excluding 65534. It is assigned by the network operator and may be changed



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periodically for performance reasons (so beware if using it in a database). As implied by the name, the LAC is assigned to a specific geographical area and will be assigned to all base stations in the defined area.

### Band

Channel number and designation of the surveyed channel. Derived from the received ARFCN.

### BSIC

Visible when using Advanced mode and Engineer mode. This number between 0 and 63 is used to differentiate between cells operating on the same frequency.

### DL (MHz)

Visible when using Engineer mode. This is the downlink frequency in MHz of the channel. This is derived from the received ARFCN.

### UL (MHz)

Visible when using Engineer mode. This is the uplink frequency in MHz of the channel. This is derived from the received ARFCN.

### Network Signal

This bar graph shows the relative strengths of the networks. The bars show percentage strength measurement. They are colour coded:

55 - 100 = green

25 - 54 = amber

0 - 24 = red

The thresholds for the colours are arbitrary and assigned by Siretta as a quick visual que to network quality. The network operator listed is a look-up of the MCC and MNC codes. If a network operator is new or changes their name it is possible that this lookup could be incorrect. Due to it being impossible for Siretta to monitor every network in every country continuously, please report any inaccuracies so that they can be corrected in a firmware update.

## 3G Survey Terms

### Cellular Network

The mobile phone network which carries not only voice but also data. Often referred to as the GSM network or mobile network, GSM being the first digital mobile telephony network.

### UMTS

Universal Mobile Telecommunications System. Also known as the 3G network

### UTRA

Universal Terrestrial Radio Access. The radio air interface of the 3G UMTS network.

### 3GPP

3rd Generation Partnership Project. This organisation publishes all the standards for cellular networks (2G, 3G, 4G and beyond, despite what their name implies). https://www.3gpp.org

## HSDPA

High Speed Downlink Packet Access. A packetized data implementation for UMTS allowing data rates to 14 MBits/s

## HSPA+

Evolved High-Speed Packet Access. A packetized data implementation for UMTS allowing data rates to 42.2 MBits/s.

## IMEI

International Mobile Equipment Identity. A 15 decimal digit number unique to the cellular device.

## ITU

International Telecommunication Union. A United Nations agency responsible for standardizing telecommunications. https://www.itu.int.

## PCI

Physical layer Cell Identity. Used for identifying the signaling used on the radio interface.

## UARFCN

UTRA Absolute Radio Frequency Channel Number. This is a 3G technology term (equivalent to ARFCN in 2G and EARFCN in 4G). Different number ranges of the UARFCN correspond to different frequency bands. For example, UARFCN 512 through 855 corresponds to GSM 1800.

## WCDMA

Wideband Code Division Multiple Access. The initial implementation of packetized data used in UMTS allowing data rates up to 7.2 MBits/sec.

## Cell

All cells discovered in the survey are ranked by signal strength, where cell number 1 is the cell with the strongest signal, 2 is the next strongest, and so on.

## Index

This is a unique index number used by the SNYPER to identify a cell. Where the survey is a single survey, the cell number and index number are the same. With multiple surveys that the Index and the Cell numbers can be different as the order of strength of the cells can differ between surveys.

## Seen (Graphyte ONLY)

Applicable to all surveys where logging has been used. It is the count of how many times that the cell was seen, and (in brackets) what percentage of the surveys made that represents. There is usually (but not always) a good correlation between received signal strength and how many times that a cell is seen.

## UARFCN

This number defines the exact uplink and downlink frequencies used by the cell. It may be any number between 0 and 65535, although in practice on the SNYPER the user will only see numbers in the range 2937 to 10838. This number may be looked up in the UMTS standard to determine the exact radio frequencies used.

## dBm or AV dBm

The measured signal strength of the network in dBm. AV dBm is the average dBm of a multicycle survey.

| dBm | Signal Strength | Description |
|---|---|---|



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| | | |
|---|---|---|
| -80 dBm or lower | | rates |
| -80 dBm to -90 dBm | Excellent | Provides fast and reliable downloads with good reliability |
| -90 dBm to -100 dBm | Moderate | Low download/update rates with occasional dropouts |
| -100 dBm or higher | Unusable | Undetermined download/update rates with regular dropouts |

## % or AV %

This measurement is derived from the dBm measurement. It is the measured signal strength expressed as a percentage of the maximum possible signal strength which could be obtained. AV % is the average percentage of a multi-cycle survey.

## RSSI or AV RSSI

This measurement is derived from the dBm measurement. It is the Received Signal Strength Indication which is obtained by looking up the dBm measurement in a table in the GSM standard. AV RSSI is the average RSSI of a multi-cycle survey.

## MCC

Mobile Country Code. It identifies the country from which the network is originating. This should mean the country in which the base station is located. Unfortunately, there are some exceptions to this so it cannot always be used as a positive country indication. Typically used with the MNC to uniquely identify the network discovered.

## MNC

Mobile Network Code. This identifies the network operator in conjunction with the MCC. Some network operators such as Vodafone operate in many countries. It cannot be assumed that such network operators will have the same MNC in all countries in which they operate.

## LAI

Location Area Identification. Comprises the MCC, MNC and the LAC to uniquely define a geographical location.

## CellID

This is a number assigned to a cell by its operator. It may be any number between 0 and 268435455. For a 3G network, this field is really called the LCID (Long Cell ID) and comprises the 12-bit RNC-ID concatenated with the 16-bit Cell ID. When combined with the LAC a base station may be uniquely identified.

## LAC

Location Area Code. It may be any number between 1 and 65535, excluding 65534. It is assigned by the network operator and may be changed periodically for performance reasons (so beware if using it in a database). As implied by the name, the LAC is assigned to a specific geographical area and will be assigned to all base stations in the defined area.

## Band

Channel number and designation of the surveyed channel. Derived from the received UARFCN.

## SCR

Visible when using Advanced mode and Engineer mode. It may be any number between 1 and 512. This is the scrambling code used by the channel. Scrambling is used to reduce inter-basestation interference. The value reported by the SNYPER is no indication of performance or cell location.

### RSCP

Visible when using Advanced mode and Engineer mode. Received Signal Code Power, reported in dBm. Valid ranges of power measurement are -115 dBm through -25 dBm. This signal power measurement takes no account of interference.

### ECIO

Visible when using Advanced mode and Engineer mode. This is the EC/IO ratio in dB. This is a measure of interference in the received signal and may be a number between 0 and 24 dB. A measurement of 0 dB means that the channel is free from interference. The more negative the measurement, the greater the noise. Cells are considered undetectable if EC/IO drops below -20 dB.

### DL (MHz)

Visible when using Engineer mode. This is the downlink frequency in MHz of the channel. This is derived from the received UARFCN.

### UL (MHz)

Visible when using Engineer mode. This is the uplink frequency in MHz of the channel. This is derived from the received UARFCN.

### Network Signal

This bar graph shows the relative strengths of the networks. The bars show percentage strength measurement. They are colour coded:

55 - 100 = green

25 - 54 = amber

0-24 = red

The thresholds for the colours are arbitrary and assigned by Siretta as a quick visual que to network quality. The network operator listed is a look-up of the MCC and MNC codes. If a network operator is new or changes their name it is possible that this lookup could be incorrect. Due to it being impossible for Siretta to monitor every network in every country continuously, please report any inaccuracies so that they can be corrected in a firmware update.

## 4G Survey Terms

### Cellular Network

The mobile phone network which carries not only voice but also data. Often referred to as the GSM network, GSM being the first digital mobile telephony network.

### LTE

Long Term Evolution, the 4G cellular network.

### MIMO

Multiple In Multiple Out. A method of increasing the capacity of a radio network by using multiple transmit and receive antennas.

### E-UTRA

Evolved UMTS Terrestrial Radio Access. The radio air interface of the 4G LTE network.

### IMEI

International Mobile Equipment Identity. A 15 decimal digit number unique to the cellular device.

## ITU

International Telecommunication Union. A United Nations agency responsible for standardizing telecommunications. https://www.itu.int.

## VoLTE

Voice over LTE. The mechanism by which packetized voice traffic is carried over the LTE network.

## Cell

All cells discovered in the survey are ranked by signal strength, where cell number 1 is the cell with the strongest signal, 2 is the next strongest, and so on.

## Index

This is a unique index number used by the SNYPER to identify a cell. Where the survey is a single survey, the cell number and index number are the same. With multiple surveys that the Index and the Cell numbers can be different as the order of strength of the cells can differ between surveys.

## Seen (Graphyte ONLY)

Applicable to all surveys where logging has been used. It is the count of how many times that the cell was seen, and (in brackets) what percentage of the surveys made that represents. There is usually (but not always) a good correlation between received signal strength and how many times that a cell is seen.

## EARFCN

This number defines the exact uplink and downlink frequencies used by the cell. The standard allows for any number between 0 and 262143, although in practice on the SNYPER the user will only see numbers in the range 0 to 27659. This number may be looked up in the LTE standard to determine the exact radio frequencies used.

## dBm or AV dBm

The measured signal strength of the network in dBm. AV dBm is the average of dBm of a multi-cycle survey.

| dBm | Signal Strength | Description |
|---|---|---|
| -80 dBm or lower | Excellent | Provides fast and reliable download/upload rates |
| -80 dBm to -90 dBm | Good | Medium download/upload rates with good reliability |
| -90 dBm to -100 dBm | Moderate | Low download/update rates with occasional dropouts |
| -100 dBm or higher | Unusable | Undetermined download/update rates with regular dropouts |

## % or AV %

This measurement is derived from the dBm measurement. It is the measured signal strength expressed as a percentage of the maximum possible signal strength which could be obtained. AV % is the average percentage of a multi-cycle survey.

## RSSI or AV RSSI

This measurement is derived from the dBm measurement. It is the Received Signal Strength Indication which is obtained by looking up the dBm



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measurement in a table in the GSM standard. AV RSSI is the average RSSI of a multi-cycle survey.

## MCC

Mobile Country Code. It identifies the country from which the network is originating. This should mean the country in which the base station is located. Unfortunately, there are some exceptions to this so it cannot always be used as a positive country indication. Typically used with the MNC to uniquely identify the network discovered.

## MNC

Mobile Network Code. This identifies the network operator in conjunction with the MCC. Some network operators such as Vodafone operate in many countries. It cannot be assumed that such network operators will have the same MNC in all countries in which they operate.

## LAI

Location Area Identification. Comprises the MCC, MNC and the LAC to uniquely define a geographical location.

## CellID

This is the Cell Identifier number assigned to a cell by its operator. It may be any number between 0 and 268435455. For a 4G network, this field is really called the LCID (Long Cell ID) and comprises the 12-bit RNC-ID concatenated with the 16-bit Cell ID. When combined with the TAC a base station may be uniquely identified.

## TAC

Tracking Area Code. It may be any number between 1 and 65535, excluding 65534. It is assigned by the network operator and may be changed periodically for performance reasons (so beware if using it in a database). The TAC is assigned to a specific geographical area and will be assigned to all base stations in the defined area.

## Band

Channel number and designation of the surveyed channel. Derived from the received EARFCN.

## PCI

Physical CellID. Visible when using Advanced mode and Engineer mode. This is the Physical layer Cell Identity (PCI). It may be any number between 0 and 503. The PCI determines how the signalling works on the radio interface and has some similarity to the way that scrambling codes are used on UMTS networks. It is not used as an identity within the network.

## RSRP

Reference Signal Received Power. This is like an RSSI measurement, and like RSSI is measured in dBm. RSSI indicates the total power in the channel passband which includes noise signals and other interference. The less negative, the stronger the signal. RSRP differs in that it measures only the power of the LTE reference signals and is therefore a better indication of the signal strength of an active connection. RSRP and/or RSRQ are used by the network to determine cell selection.

## RSRQ

Reference Signal Received Quality. This is the ratio of the RSRP measurement to the RSSI measurement measured in dB. The less negative, the better the quality of the signal. RSRP and/or RSRQ are used by the network to determine cell selection, although RSRP is usually chosen as the primary selection method.

## BW

Visible when using Advanced mode and Engineer mode. This is the downlink bandwidth in MHz.

## DL (MHz)


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Visible when using Engineer mode. This is the downlink frequency in MHz of the channel. This is derived from the received EARFCN.

## UL (MHz)

Visible when using Engineer mode. This is the uplink frequency in MHz of the channel. This is derived from the received EARFCN.

## Network Signal

This bar graph shows the relative strengths of the networks. The bars show percentage strength measurement. They are colour coded:

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