

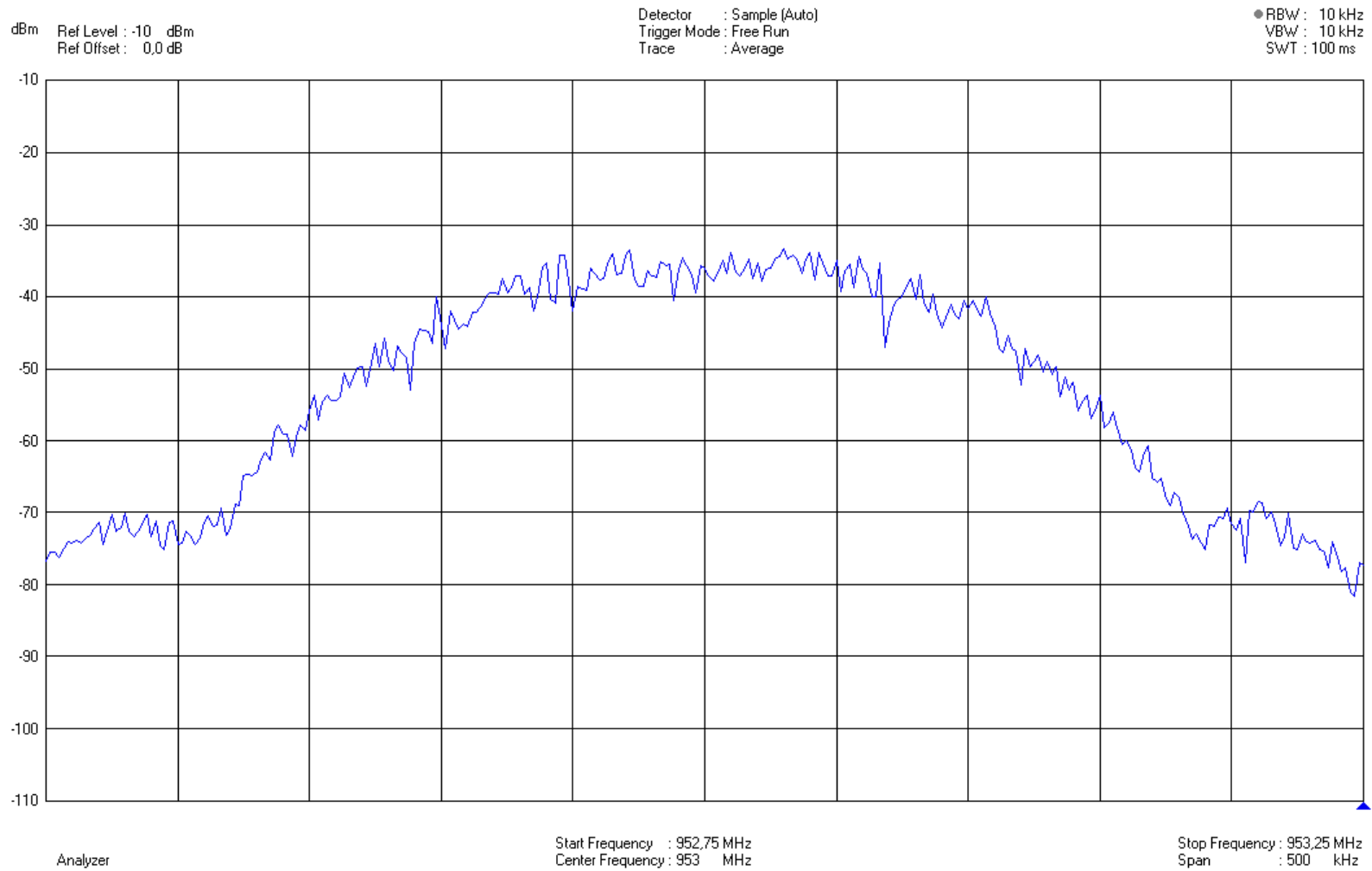
# Medidas sobre el sistema GSM

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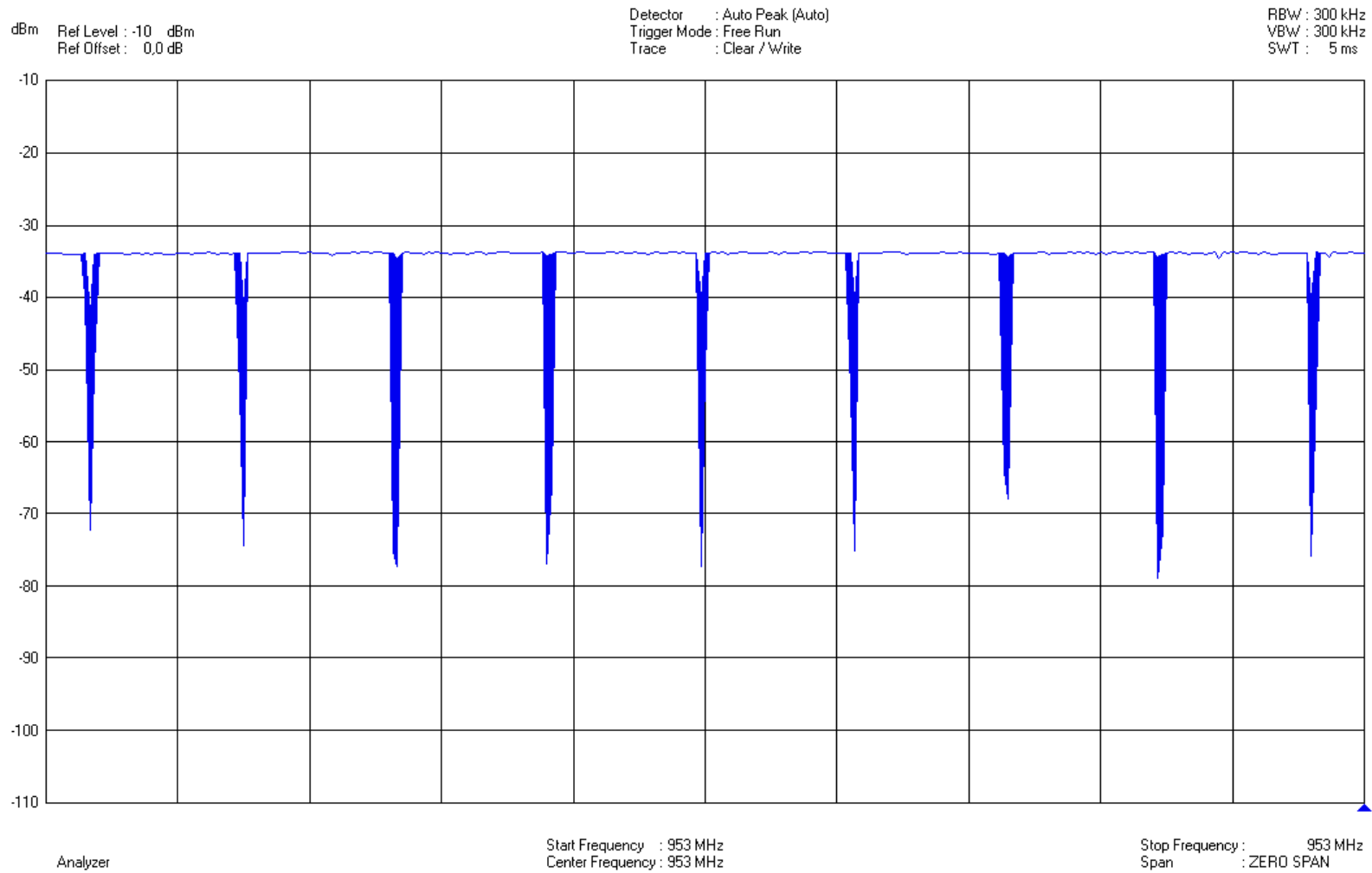
1. Analizador de espectros (dominios de la frecuencia y del tiempo)
2. Herramienta de monitorización de la interfaz radio (TEMS)

# 1. Analizador de espectros (dominios de la frecuencia y del tiempo)

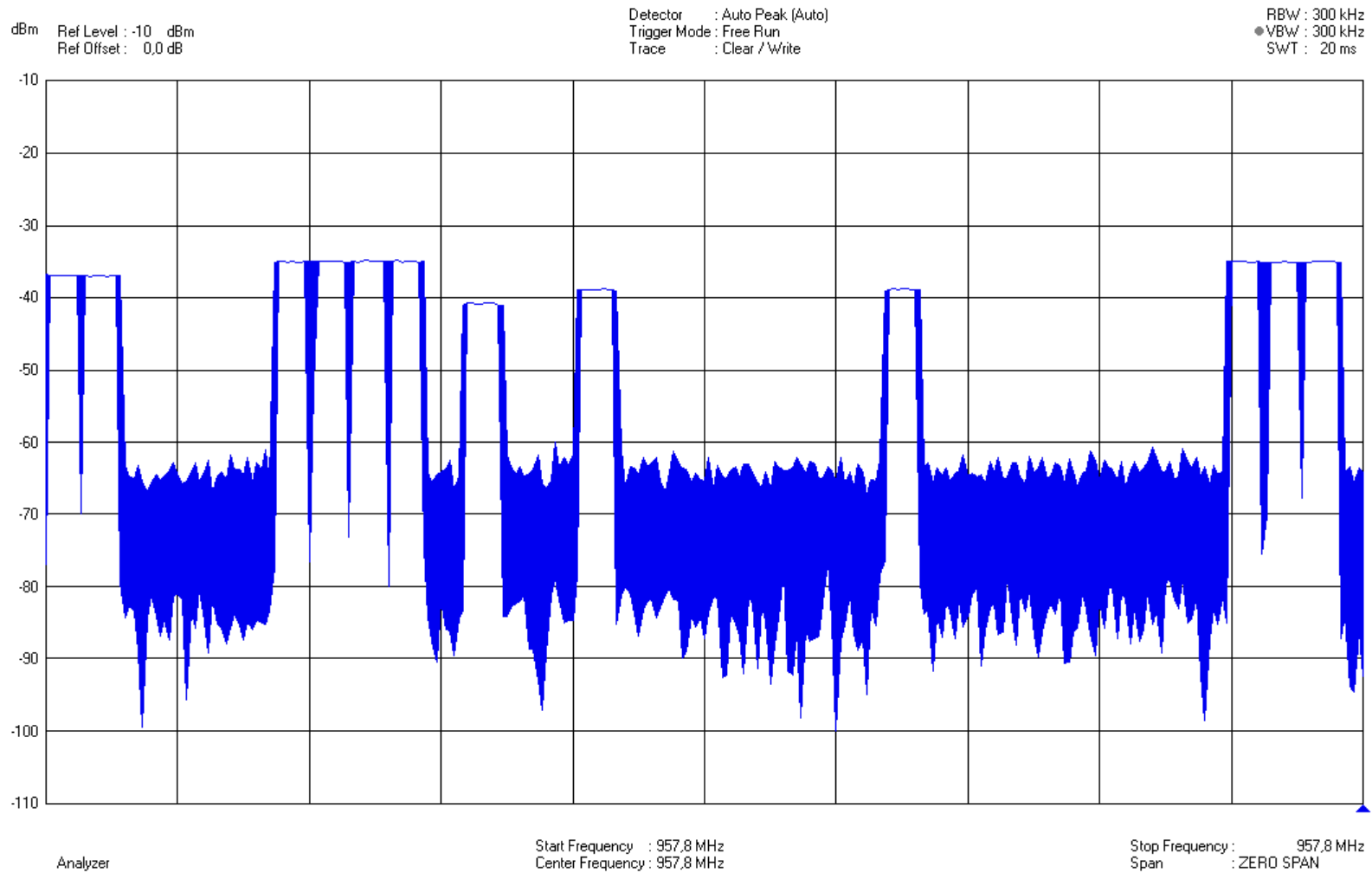
# Espectro



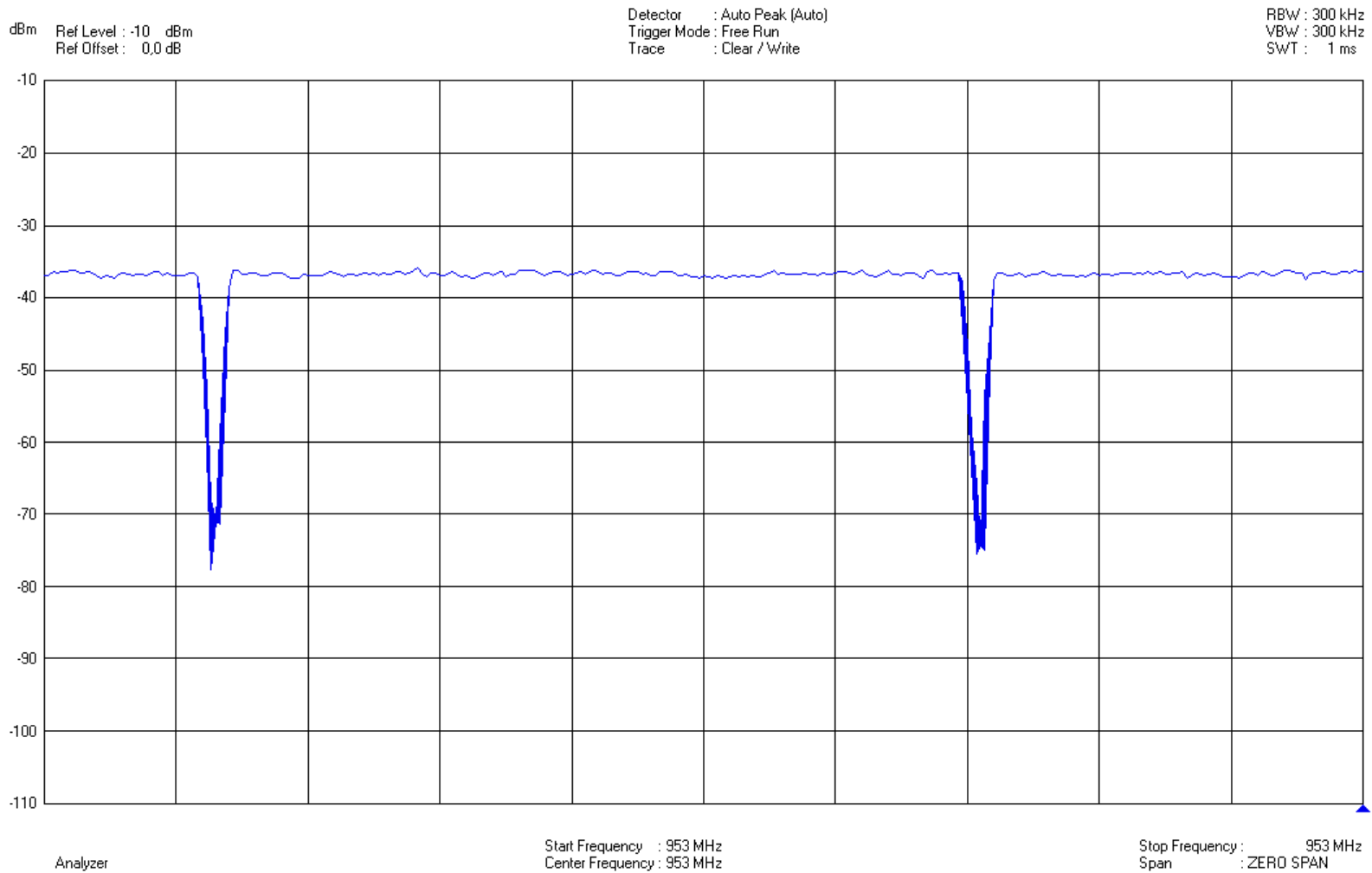
# Trama, portadora baliza



# Tramas, portadora no baliza



# Intervalos, portadora baliza



## 2. Herramienta de monitorización de la interfaz radio (TEMS)



# Vista general de la herramienta

TEMS GSM 900 1800/98.0.3

File Externals Monitor Log Mgbile Control Help

**Graphical presentation**

RxLev 60  
RxLev 40  
RxLev 20  
Level  
RxQual & C/A  
TA & TxPwr  
SQI & FER

Selection data

BCCH:	RxLev:	Neighbour	RxLev:
TCH:	RxQual:		
BSIC:	TA:		
LAC:	TxPwr:	C/A Scan	
CI:	FER:	-1: +1:	
	SQI:	-2: +2:	

Filemark:

**Layer 3 messages**

```

DL: SYSTEM INFORMATION TYPE 6
UL: MEASUREMENT REPORT
DL: SYSTEM INFORMATION TYPE 5
UL: MEASUREMENT REPORT
DL: SYNCH CHANNEL INFORMATION
DL: SYSTEM INFORMATION TYPE 5ter
UL: MEASUREMENT REPORT
DL: DISCONNECT
UL: RELEASE
DL: RELEASE COMPLETE
DL: SYSTEM INFORMATION TYPE 6
DL: CHANNEL RELEASE
UL: MEASUREMENT REPORT
DL: SYSTEM INFORMATION TYPE 1
DL: SYSTEM INFORMATION TYPE 2
DL: SYSTEM INFORMATION TYPE 3
DL: SYSTEM INFORMATION TYPE 4
DL: SYSTEM INFORMATION TYPE 4
DL: SYSTEM INFORMATION TYPE 3
DL: SYSTEM INFORMATION TYPE 4
DL: SYSTEM INFORMATION TYPE 1
DL: SYSTEM INFORMATION TYPE 3
DL: SYSTEM INFORMATION TYPE 2
DL: PAGING REQUEST TYPE 1
DL: SYSTEM INFORMATION TYPE 3
DL: SYSTEM INFORMATION TYPE 3
DL: SYSTEM INFORMATION TYPE 2ter
DL: PAGING REQUEST TYPE 1
DL: PAGING REQUEST TYPE 1
DL: PAGING REQUEST TYPE 1
DL: PAGING REQUEST TYPE 1
DL: PAGING REQUEST TYPE 1
DL: PAGING REQUEST TYPE 1
DL: PAGING REQUEST TYPE 1
DL: PAGING REQUEST TYPE 1
DL: SYNCH CHANNEL INFORMATION
DL: PAGING REQUEST TYPE 1
DL: PAGING REQUEST TYPE 1
    
```

**UL: MEASUREMENT REPORT**

Time: 15:53:49.83  
Lat: not valid Lon: not valid  
Frame number: 1004715

Measurement results

RXLEV-FULL-SERVING: 15  
RXLEV-SUB-SERVING: 15  
RXQUAL-FULL-SERVING: 0  
RXQUAL-SUB-SERVING: 0  
BA-USED: 1  
DTX: Used

Measurement results (MEAS-VALID): Valid  
Number of neighbouring cell measurements: 2

NCELL	RXLEV-NCELL	BSIC-NCELL	BCCH-FREQ-NCELL
1	14	07	07
2	12	23	21
3	00	00	00
4	00	00	00
5	00	00	00
6	00	00	00

Message dump:

```

06 15 cf 0f 00 8e 38 e6 55 30
00 00 00 00 00 00 00 00
    
```

# Mensajes (capa 3) durante una llamada

The image displays three sequential screenshots of a 'Layer 3 messages' window, showing the flow of signaling messages during a call. Each window contains a list of messages, alternating between Downlink (DL) and Uplink (UL) directions.

**Window 1 (Left):**

- DL: SYNCH CHANNEL INFORMATION
- DL: PAGING REQUEST TYPE 1
- DL: SYSTEM INFORMATION TYPE 2ter
- UL: CHANNEL REQUEST
- DL: IMMEDIATE ASSIGNMENT
- UL: CM SERVICE REQUEST
- DL: SYSTEM INFORMATION TYPE 5
- UL: CLASSMARK CHANGE
- DL: CIPHERING MODE COMMAND
- UL: CIPHERING MODE COMPLETE
- UL: SETUP
- DL: SYSTEM INFORMATION TYPE 5ter
- DL: IDENTITY REQUEST
- UL: IDENTITY RESPONSE
- UL: MEASUREMENT REPORT
- DL: SYSTEM INFORMATION TYPE 6
- DL: CALL PROCEEDING
- UL: MEASUREMENT REPORT
- DL: SYSTEM INFORMATION TYPE 5
- UL: MEASUREMENT REPORT
- DL: ASSIGNMENT COMMAND
- UL: ASSIGNMENT COMPLETE
- DL: SYSTEM INFORMATION TYPE 5ter
- UL: MEASUREMENT REPORT
- DL: SYSTEM INFORMATION TYPE 6
- UL: MEASUREMENT REPORT
- DL: SYSTEM INFORMATION TYPE 5

**Window 2 (Middle):**

- UL: MEASUREMENT REPORT
- DL: SYSTEM INFORMATION TYPE 6
- UL: MEASUREMENT REPORT
- DL: SYSTEM INFORMATION TYPE 5
- UL: MEASUREMENT REPORT
- DL: SYSTEM INFORMATION TYPE 5ter
- UL: MEASUREMENT REPORT
- DL: SYSTEM INFORMATION TYPE 6
- UL: MEASUREMENT REPORT
- DL: SYNCH CHANNEL INFORMATION
- DL: SYSTEM INFORMATION TYPE 5
- DL: HANDOVER COMMAND
- UL: HANDOVER ACCESS
- UL: MEASUREMENT REPORT
- DL: PHYSICAL INFORMATION
- UL: HANDOVER COMPLETE
- DL: PHYSICAL INFORMATION
- DL: PHYSICAL INFORMATION
- DL: PHYSICAL INFORMATION
- DL: PHYSICAL INFORMATION
- DL: ALERTING
- DL: CONNECT
- DL: SYSTEM INFORMATION TYPE 6
- UL: CONNECT ACKNOWLEDGE
- UL: MEASUREMENT REPORT
- DL: SYSTEM INFORMATION TYPE 5
- UL: MEASUREMENT REPORT

**Window 3 (Right):**

- UL: MEASUREMENT REPORT
- DL: SYSTEM INFORMATION TYPE 6
- UL: MEASUREMENT REPORT
- DL: SYSTEM INFORMATION TYPE 5
- UL: MEASUREMENT REPORT
- DL: SYNCH CHANNEL INFORMATION
- DL: SYSTEM INFORMATION TYPE 5ter
- UL: MEASUREMENT REPORT
- DL: SYSTEM INFORMATION TYPE 6
- UL: MEASUREMENT REPORT
- DL: SYSTEM INFORMATION TYPE 5
- UL: MEASUREMENT REPORT
- DL: SYNCH CHANNEL INFORMATION
- DL: SYSTEM INFORMATION TYPE 5ter
- UL: MEASUREMENT REPORT
- DL: SYSTEM INFORMATION TYPE 6
- UL: MEASUREMENT REPORT
- DL: DISCONNECT
- UL: RELEASE
- DL: SYSTEM INFORMATION TYPE 5
- DL: RELEASE COMPLETE
- DL: CHANNEL RELEASE
- UL: MEASUREMENT REPORT
- DL: SYSTEM INFORMATION TYPE 1
- DL: SYSTEM INFORMATION TYPE 2
- DL: SYSTEM INFORMATION TYPE 3
- DL: SYSTEM INFORMATION TYPE 4

# Mensajes en modo desocupado

DL: SYSTEM INFORMATION TYPE 1	DL: SYSTEM INFORMATION TYPE 2	DL: SYSTEM INFORMATION TYPE 2ter
<p>Time: 14:41:33.87            Lat: not valid Lon: not valid            Frame number: 65290</p> <p>Read from [ARFCN]: 762            L2 Pseudo Length: 21            Cell channel description            Cell Allocation            Format notation: Variable bit map            ARFCN:                762</p> <p>RACH control parameters            Max retransmissions: 4            Tx-integer: 12            Cell bar access: Not barred            Call reestablishment (RE): Not allowed            Emergency call (EC) allowed: All MS            Not barred class(es) [ACC]: 0 1 2 3 4 5 6 7                                              8 9 11 12 13 14 15</p> <p>SI 1 Rest Octets contains spare bits</p> <p>Message dump:            02 fa 55 06 19 8f 7d 00 00 00            00 00 00 00 00 00 00 00 00 00            00 a5 00 00 2b</p>	<p>Time: 14:41:34.11            Lat: not valid Lon: not valid            Frame number: 65341</p> <p>Read from [ARFCN]: 762            L2 Pseudo Length: 22            Neighbour cells description            BA-IND: 0            EXT-IND: 0            BCCH Allocation            Format notation: Variable bit map            ARFCN:                735 737 740 743 752 754 757 762 764 770</p> <p>NCC permitted: 0 1 2 3 4 5 6 7</p> <p>RACH control parameters            Max retransmissions: 4            Tx-integer: 12            Cell bar access: Not barred            Call reestablishment (RE): Not allowed            Emergency call (EC) allowed: All MS            Not barred class(es) [ACC]: 0 1 2 3 4 5 6 7                                              8 9 11 12 13 14 15</p> <p>Message dump:            02 fa 59 06 1a 8f 6f a4 80 52            14 10 00 00 00 00 00 00 00 00            00 ff a5 00 00</p>	<p>Time: 14:41:36.92            Lat: not valid Lon: not valid            Frame number: 65951</p> <p>Read from [ARFCN]: 762            L2 Pseudo Length: 0            Neighbour cells description 2            Multiband reporting: 2            BA-IND: 0            BCCH Allocation            Format notation: Bit map 0            ARFCN:                65 66 67 68 69 70 72 73 74 75                76 77 78 79 80 81 82 122 123 124</p> <p>SI 2ter Rest Octets contains spare bits</p> <p>Message dump:            02 fa 01 06 03 4e 00 00 00 00            03 ff bf 00 00 00 00 00 00 00            00 2b 2b 2b 2b</p>

# Mensajes en modo desocupado

```
DL: SYSTEM INFORMATION TYPE 4
Time: 14:41:34.58
Lat: not valid Lon: not valid
Frame number: 65443

Read from [ARFCN]: 762
L2 Pseudo Length: 12
Location area identification
  Mobile country code [MCC]: 214
  Mobile network code [MNC]: 01
  Location area code [LAC]: 469b (hex)
Cell selection parameters
  CELL-RESELECT HYSTERESIS: 8 dB RXLEV
  MS-TXPWR-MAX-CCH: 0
  ADDITIONAL RESELECT PARAM IND [ACS]
  The SI 4 rest octets, if present, shall be used to derive the
  value of PI and possibly C2 parameters and/or other parameters
  HALF RATE SUPPORT (NECI):
  New establishment causes are not supported
  RXLEV-ACCESS-MIN: 0
RACH control parameters
  Max retransmissions: 4
  Tx-integer: 12
  Cell bar access: Not barred
  Call reestablishment [RE]: Not allowed
  Emergency call [EC] allowed: All MS
  Not barred class(es) [ACC]: 0 1 2 3 4 5 6 7
  8 9 11 12 13 14 15
SI 4 Rest Octets
  Cell Reselect Parameters Indication [PI]: C2 Parameters present
  Cell Bar Qualify [CBQ]: 0
  If Cell Bar Access = 0
    Cell Selection priority: Normal
    Status for cell reselection: Normal
  else
    Cell Selection priority: Barred
    Status for cell reselection: Barred
  Cell Reselection Offset: 0 dB
  Temporary Offset: 0 dB
  Penalty Time: 20 s
  Power Offset Indication [POI]: Power Offset Parameter not present

Message dump:
  02 fa 31 06 1c 12 f4 10 46 9b
  80 00 a5 00 00 80 00 2b 2b 2b
  2b 2b 2b 2b 2b
```

```
DL: SYSTEM INFORMATION TYPE 3
Read from [ARFCN]: 762
L2 Pseudo Length: 18
Cell Identity: 376c (hex)
Location area identification
  Mobile country code [MCC]: 214
  Mobile network code [MNC]: 01
  Location area code [LAC]: 469b (hex)
Control channel description
  Attach/detach allowed [ATT]: Yes
  BS-AG-BLKS-RES: 1
  CCCH-CONF: 1 basic physical channel, not combined with SDCCH's
  BS-PA-MFRMS: 5 multiframe period
  T3212 timeout value: 20
Cell options[BCCH]
  Power control indicator [PWRC]: Not set
  DTX indicator: MS shall use uplink discontinuous transmission
  RADIO-LINK-TIMEOUT: 16
Cell selection parameters
  CELL-RESELECT HYSTERESIS: 8 dB RXLEV
  MS-TXPWR-MAX-CCH: 0
  RXLEV-ACCESS-MIN: 0
RACH control parameters
  Max retransmissions: 4
  Tx-integer: 12
  Cell bar access: Not barred
  Call reestablishment [RE]: Not allowed
  Emergency call [EC] allowed: All MS
  Not barred class(es) [ACC]: 0 1 2 3 4 5 6 7
  8 9 11 12 13 14 15
SI 3 Rest Octets
  Cell Reselect Parameters Indication [PI]: C2 Parameters present
  Cell Bar Qualify [CBQ]: 0
  If Cell Bar Access = 0
    Cell Selection priority: Normal
    Status for cell reselection: Normal
  else
    Cell Selection priority: Barred
    Status for cell reselection: Barred
  Cell Reselection Offset: 0 dB
  Temporary Offset: 0 dB
  Penalty Time: 20 s
  Power Offset Indication [POI]: Power Offset Parameter not present
  Early Sending: Explicitly accepted
  System Information 2ter: Available
```



# Asignación de canal. Informe de medidas

## DL: IMMEDIATE ASSIGNMENT

Time: 14:41:24.57  
Lat: not valid Lon: not valid  
Frame number: 2708631

L2 Pseudo Length: 12  
Page mode: Extended paging  
Channel description  
Channel type: SDCCH/8 + SACCH/C8 or CBCH (SDCCH/8)  
Subchannel number: 4  
Timeslot number (TN): 1  
Training sequence code (TSC): 3  
Hopping channel: RF hopping channel  
Mobile allocation index offset (MAIO): 0  
Hopping sequence number (HSN): 55  
Request reference 1  
Establish cause (RA): Answer to paging  
Random reference (RA): 2  
T1: 26  
T2: 0  
T3: 43  
Timing advance value: 0  
Mobile allocation: 2 3  
IA Rest Octets (Frequency parameters, before time)  
IA Rest Octets contains spare bits

Message dump:  
01 31 06 3f 01 61 70 37 82 d5  
60 00 01 06 2b 2b 2b 2b 2b 2b  
2b 2b 2b 2b

## UL: MEASUREMENT REPORT

Time: 14:41:25.49  
Lat: not valid Lon: not valid  
Frame number: 2708831

Measurement results  
RXLEV-FULL-SERVING: 55  
RXLEV-SUB-SERVING: 55  
RXQUAL-FULL-SERVING: 0  
RXQUAL-SUB-SERVING: 0  
BA-USED: 0  
DTX: Not used  
Measurement results (MEAS-VALID): Valid  
Number of neighbouring cell measurements: 4

NCELL	RXLEV-NCELL	BSIC-NCELL	BCCH-FREQ-NCELL
1	41	07	21
2	40	16	02
3	33	23	06
4	31	17	01
5	00	00	00
6	00	00	00

Message dump:  
06 15 37 37 01 29 a8 f4 08 e8  
4c 9b e1 3c 00 00 00 00