

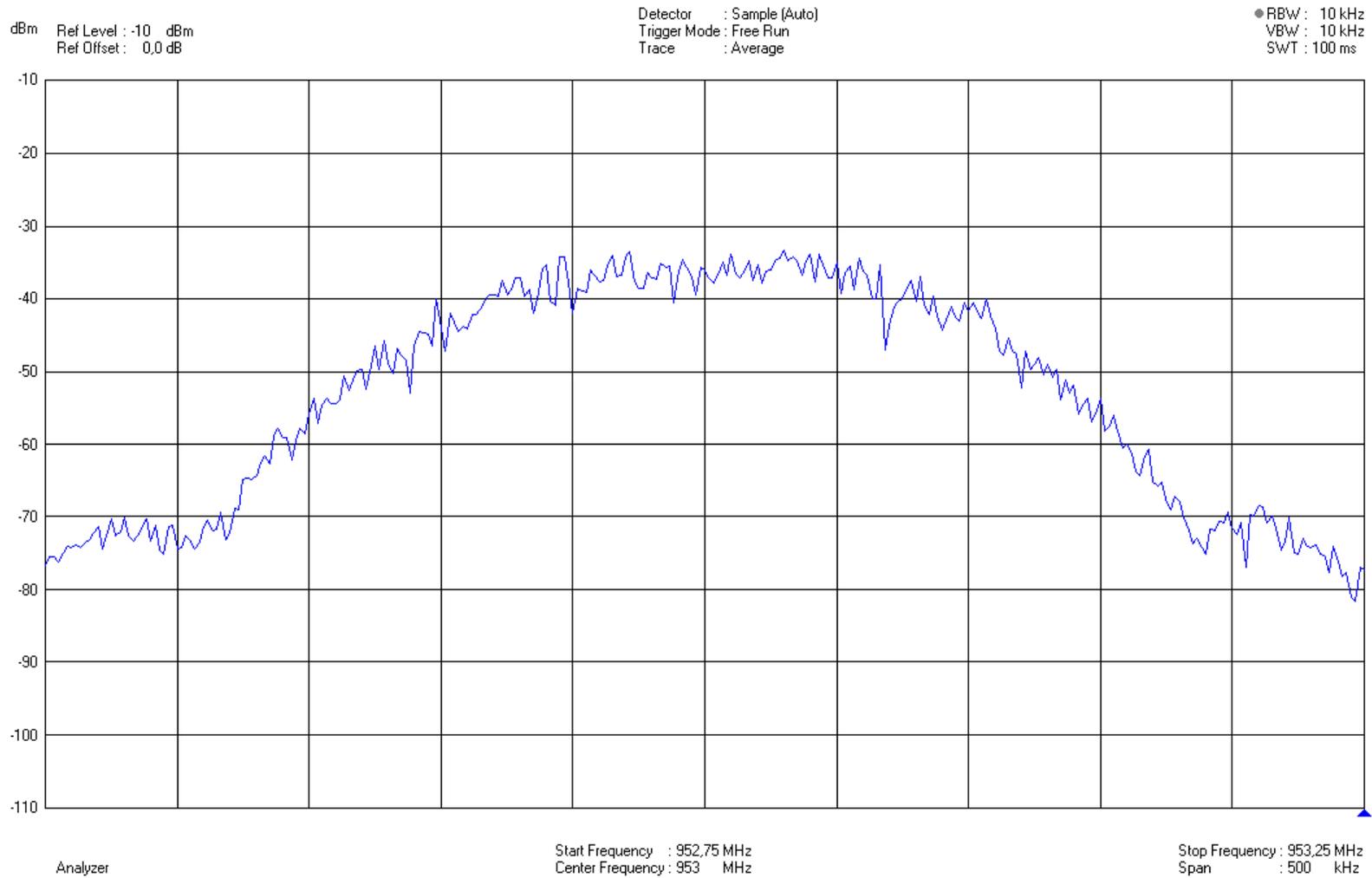
Medidas sobre el sistema GSM

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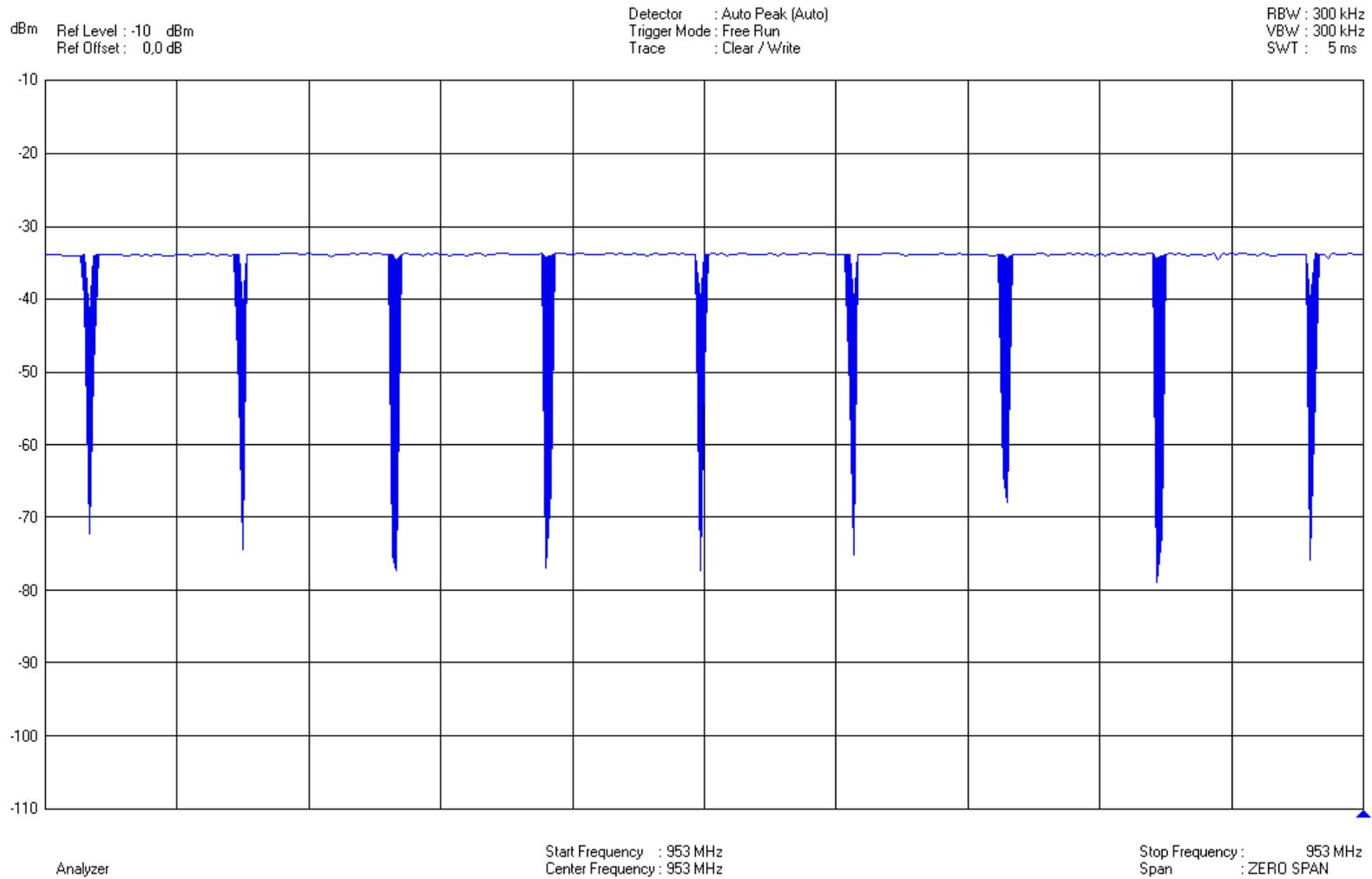
1. Analizador de espectros (dominios de la frecuencia y del tiempo)
2. Herramienta de monitorización de la interfaz radio (TEMS)

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

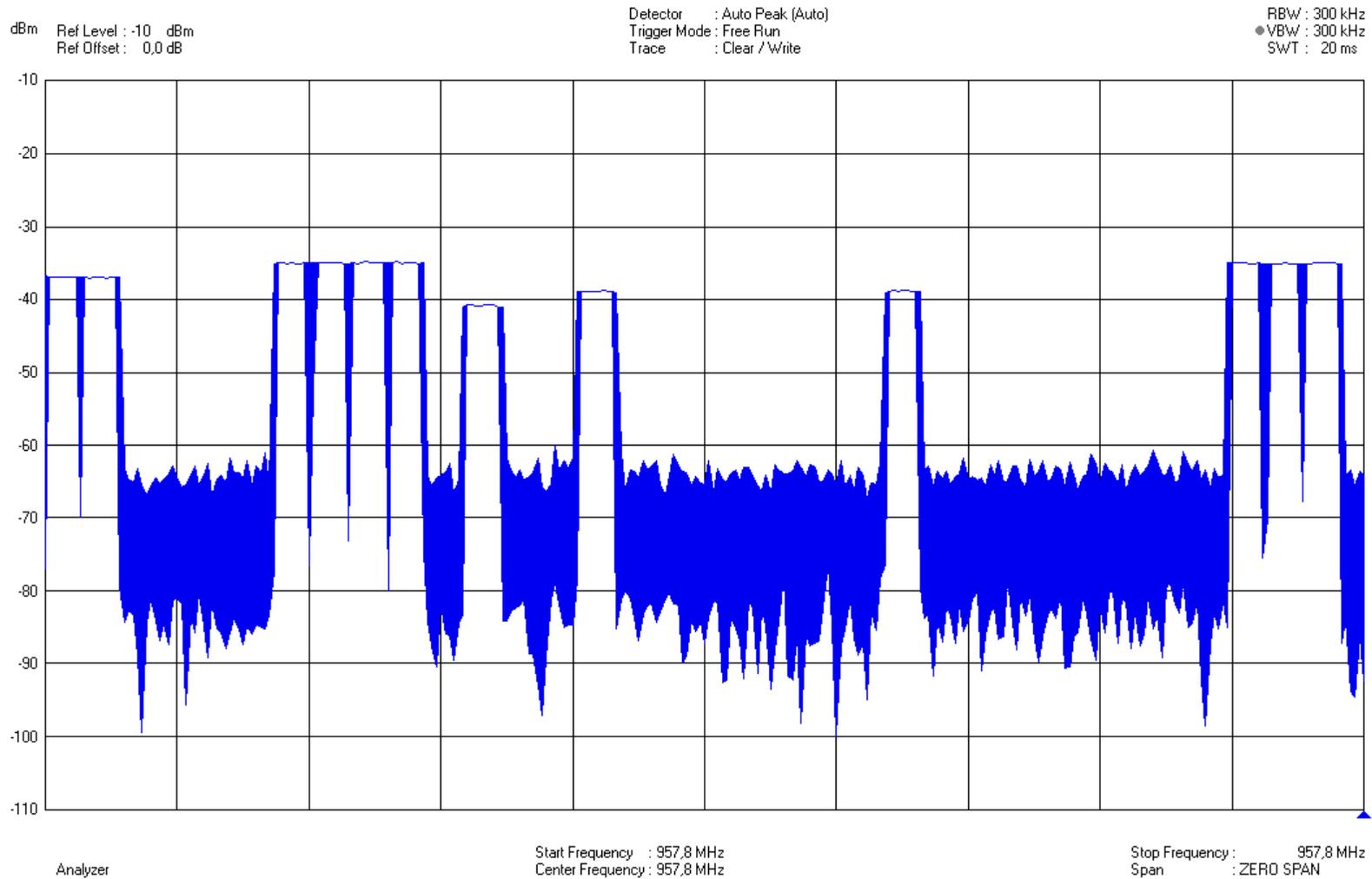
Espectro



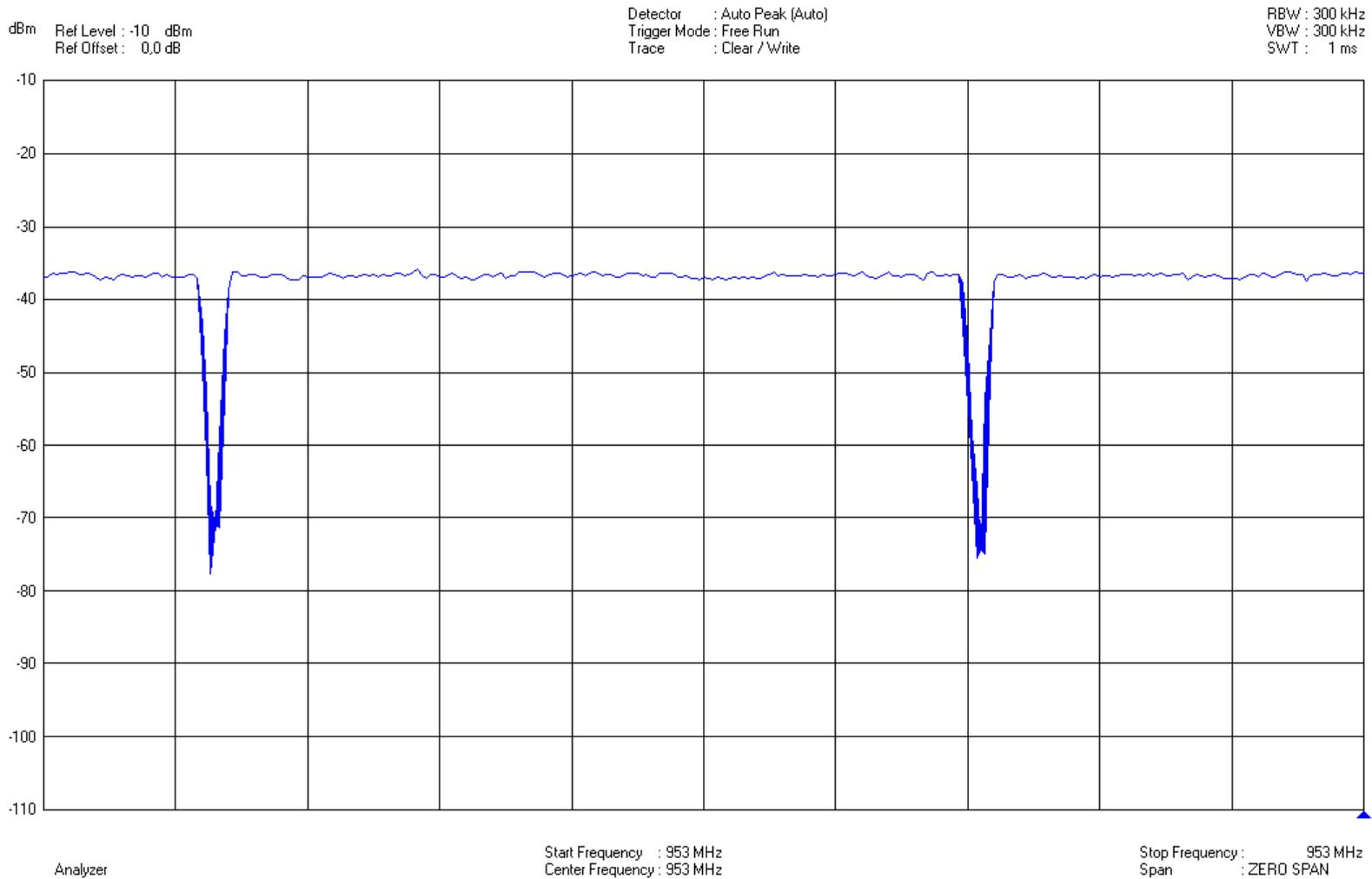
Trama, portadora baliza



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: 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