GUIRADO Adrien
BANULS Baptiste
LARDENOIS Jérémy
LAFORGE Samuel

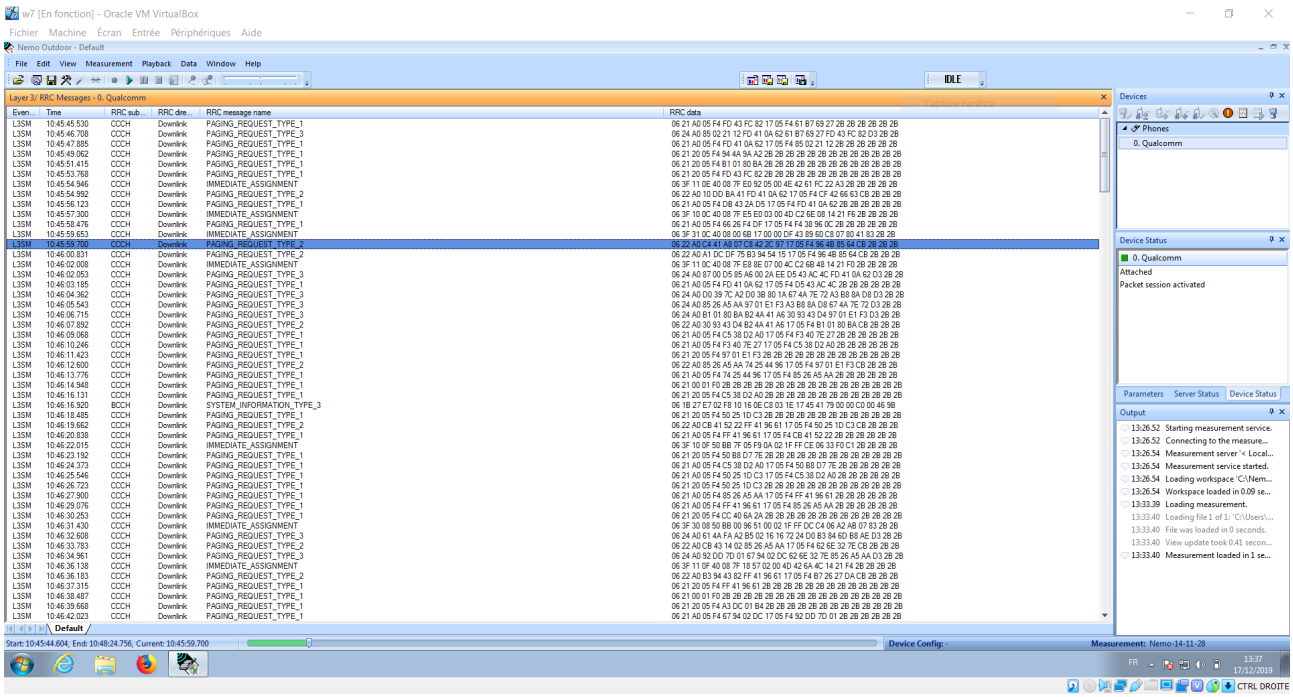
Réseaux cellulaires

Analyse de trames 2G

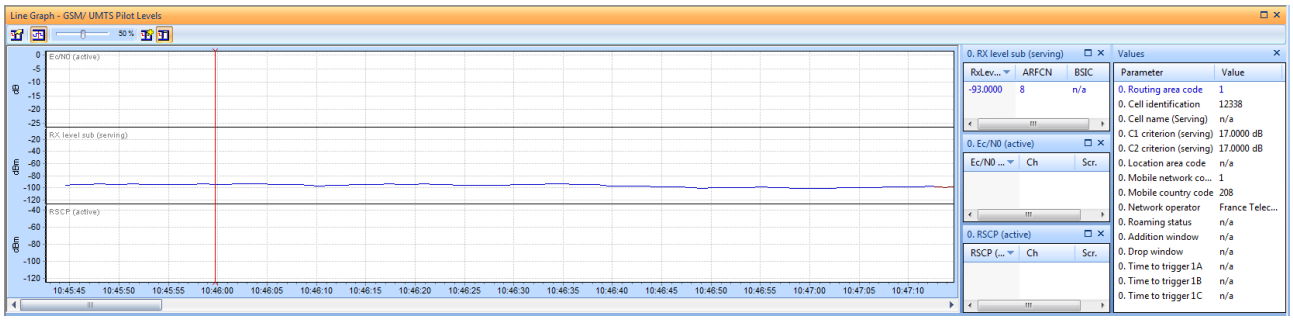
Table des matières

1 – Etude des niveaux de signal

a/



b/



-

Parameter	Value
0. Routing area code	1
0. Cell identification	12338

La 1ère cellule utilisée est la 12338

Parameter	Value
0. Routing area code	1
0. Cell identification	30312

La 2ème est la 30312

-

L3SM	10:47:11.918	DCCH	Uplink
L3SM	10:47:12.325	SACCH	Downlink
L3SM	10:47:12.372	SACCH	Uplink

On change de cellule à 10:47:12.325

-

RxLev...	ARFCN	BSIC
-101.0000	8	n/a

RxLev...	ARFCN	BSIC
-98.0000	16	n/a

Les canaux utilisés sur ces cellules sont les canaux 8 et 16

-

L3SM	10:47:12.372	SACCH
L3SM	10:47:12.736	DCCH
L3SM	10:47:12.740	DCCH
L3SM	10:47:59.700	CCCH
L3SM	10:48:00.123	BCCH
L3SM	10:48:00.876	CCCH

On a changé de canal aux instants 10:47:12.736 et 10:48:00.123

-

RxLev sub ...	ARFCN	BSIC
-94.0000	8	n/a

A l'instant 10:45:50, le niveau de réception est de -94 dBm et le BSIC est n/a

-

RxLev sub ...	ARFCN	BSIC
-96.0000	8	26

A l'instant 10:48:20, le niveau de réception est de -96 dBm et le BSIC est 26

-

0. Hopping status	n/a
0. Hopping channels	n/a
0. Timing advance	n/a
0. TMSI	64 00 77 9E

Le 1er changement est à 10:47:09.508

0. Hopping status	n/a
0. Hopping channels	n/a
0. Timing advance	10
0. TMSI	64 00 77 9E

Le 2ème changement est à 10:47:09.976

0. Hopping status	On
0. Hopping channels	16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 47, 48, 49
0. Timing advance	10
0. TMSI	64 00 77 9E

Le 3ème changement est à 10:47:12.325

0. Hopping status	n/a
0. Hopping channels	n/a
0. Timing advance	n/a
0. TMSI	64 00 77 9E

Le dernier changement est à 10:47:58.440

- 0. Hopping channels 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 47, 48, 49

Ce sont les canaux à utiliser pour les sauts de fréquence

- 0. Timing advance 10

$$D = \frac{T * C}{2} = \frac{\frac{3*10^{8}*48*10*10^{-6}}{13}}{2} = 5538\text{m}$$

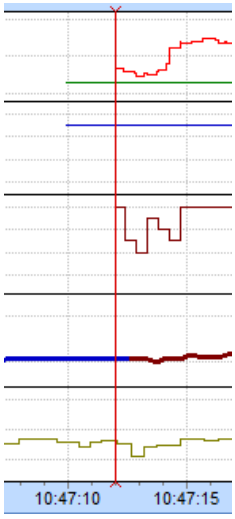
c/

RxLev full (dBm)
-105.1000
-106.4000

Les fréquences voisines sont 105.1 MHz et 106.4 MHz

d/

- AMR signifie « Adaptative Multi Rate »
-



La communication commence à 10:47:11.918 et se termine à 10:47:58.246

- Le graphique C/I average indique le rapport signal à bruit (carrier/interference)

e/

GSM L1 Problems - 0. Qualcomm (Filtered)

Event name	Time	BLER DL	RX level sub (serving)	RX quality sub	Packet RX quality	Frame error rate sub	C/I average	AMR link quality estimate
Cell measurement	10:45:44.604		-96.0000					
Cell measurement	10:45:45.531		-95.0000					
Cell measurement	10:45:46.708		-94.0000					
Cell measurement	10:45:48.146		-93.0000					
Cell measurement	10:45:49.062		-94.0000					
Cell measurement	10:45:50.238		-94.0000					
Cell measurement	10:45:51.415		-93.0000					
Cell measurement	10:45:52.592		-94.0000					
Cell measurement	10:45:53.768		-95.0000					
Cell measurement	10:45:54.992		-95.0000					
Carrier per interference	10:45:54.992						11.9000	
Cell measurement	10:45:56.123		-95.0000					
Cell measurement	10:45:57.300		-95.0000					
Cell measurement	10:45:58.477		-93.0000					
Cell measurement	10:45:59.700		-94.0000					
Cell measurement	10:46:00.831		-94.0000					
Cell measurement	10:46:02.053		-93.0000					
Cell measurement	10:46:03.185		-93.0000					
Cell measurement	10:46:04.362		-93.0000					
Cell measurement	10:46:05.651		-95.0000					
Carrier per interference	10:46:05.651						5.6000	
Cell measurement	10:46:06.715		-95.0000					
Cell measurement	10:46:08.287		-95.0000					

- Les différents messages utilisés sont « Cell measurement », « Carrier per interference » et « RX quality »
-

Band (neighbor)	GSM 900
Channel number (neighbor)	13
Base station identification code (neighbor)	n/a
RX level full (neighbor) (dBm)	-101.4000
Band (neighbor)	GSM 900
Channel number (neighbor)	15
Base station identification code (neighbor)	n/a
RX level full (neighbor) (dBm)	-103.8000
Band (neighbor)	GSM 900
Channel number (neighbor)	5
Base station identification code (neighbor)	56
RX level full (neighbor) (dBm)	-104.0000
Band (neighbor)	GSM 900
Channel number (neighbor)	11
Base station identification code (neighbor)	n/a
RX level full (neighbor) (dBm)	-104.9000
Band (neighbor)	GSM 900

Les fréquences voisines de la Q1.c on été obtenues à partir de la partie « Neighbor »

•

Event name	Time
Carrier per interference	10:47:05.571
Cell measurement	10:47:06.788
Carrier per interference	10:47:06.788
Cell measurement	10:47:07.915
Cell measurement	10:47:09.471
Carrier per interference	10:47:09.471
Cell measurement	10:47:09.887
Carrier per interference	10:47:09.887
Cell measurement	10:47:10.445
Carrier per interference	10:47:10.445
Cell measurement	10:47:10.916
Carrier per interference	10:47:10.916
Cell measurement	10:47:11.390
Cell measurement	10:47:12.057
Carrier per interference	10:47:12.057
RX quality	10:47:12.372
Cell measurement	10:47:12.675
Carrier per interference	10:47:12.675
RX quality	10:47:12.805
RX quality	10:47:12.852
Cell measurement	10:47:13.183
Carrier per interference	10:47:13.183
Cell measurement	10:47:13.728

Le 1er message « RX quality » apparaît à 10:47:12.372, ce qui correspond bien au début de la communication, comme on l'a vu dans la question d.

f/

- Handover est un mécanisme permettant de changer de cellule radio sans interrompre la communication
-

HANDOVER/HANDOFF ATTEMPT
Time: 10:47:28.636

Handover context ID	2
Number of header parameters	1
Handover/handoff attempt type	GSM handover between cells
Current cellular system	GSM
Channel number	8
Timeslot	3
Band	GSM 900
Attempted cellular system	GSM
Attempted channel number	5
Attempted timeslot	2
Attempted band	GSM 900

Le Handover demandé est de type « GSM handover between cells »

g/ Le mobile détermine les canaux des cellules voisines grâce aux informations situées dans ces trames :

NEIGHBOR LIST
Time: 10:47:12.057

Number of neighbor channels	14
Measured system	GSM

Neighbor channel number (GSM)	1
Neighbor BSIC	n/a
Band	GSM 900
Cell index (GSM)	n/a
Neighbor channel number (GSM)	2
Neighbor BSIC	n/a
Band	GSM 900
Cell index (GSM)	n/a
Neighbor channel number (GSM)	3
Neighbor BSIC	n/a
Band	GSM 900
Cell index (GSM)	n/a
Neighbor channel number (GSM)	4

2 – Messages de la couche 3

a/

Event name	Time	Call type	Called number
Call attempt	10:47:10.688	Voice call	888

Le numéro appelé est le 888