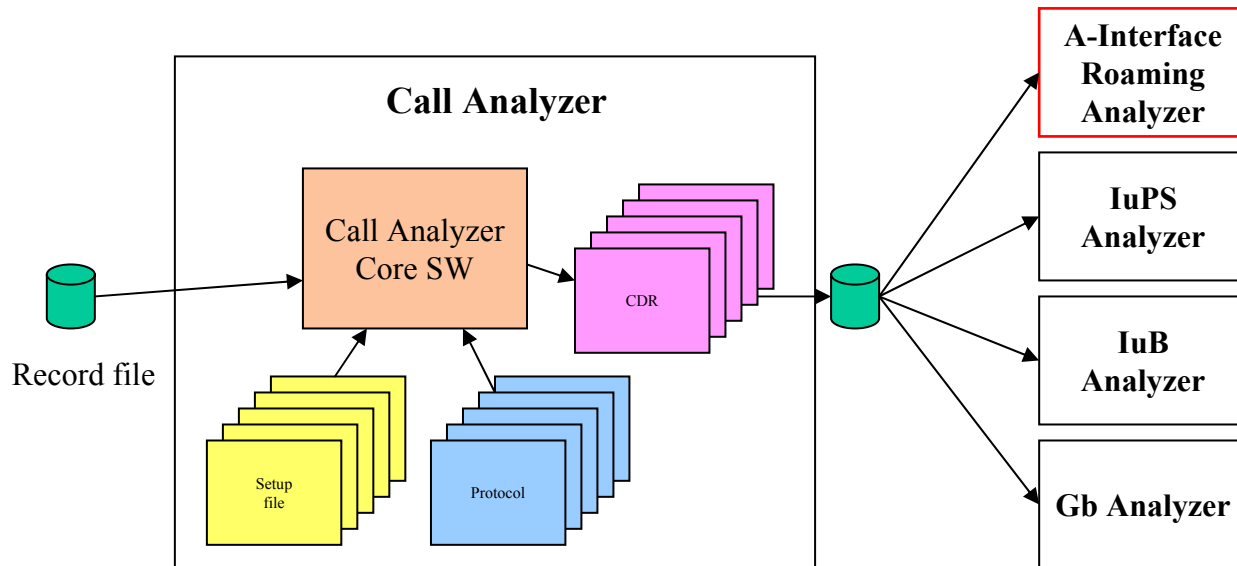




Call Analyser

GSM Roaming Analyzer

Call Analyser product family



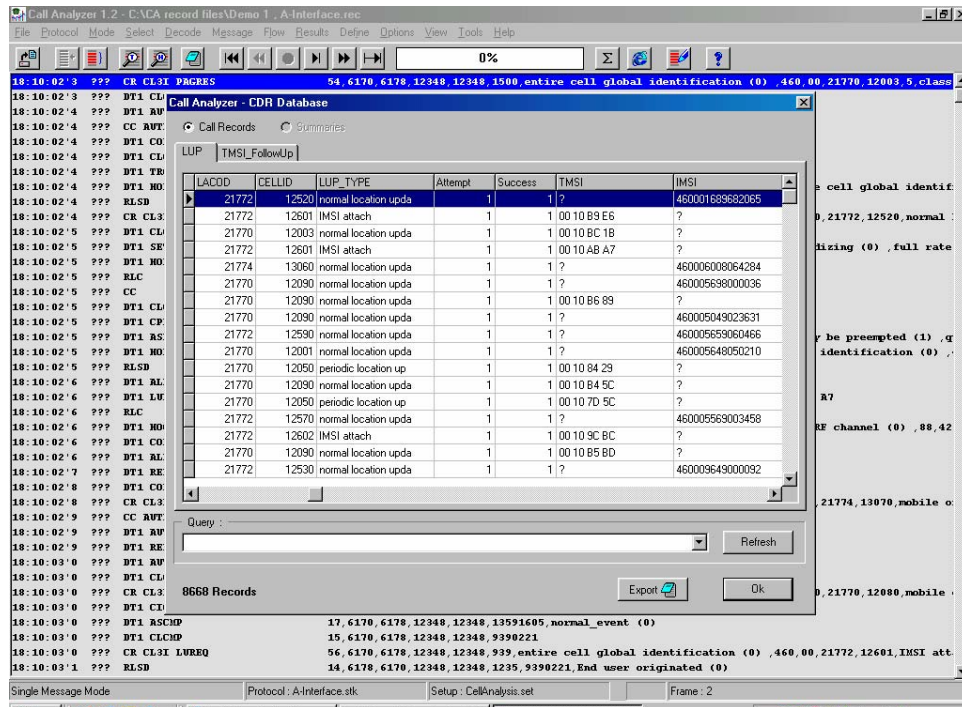
GSM Roaming Analyzer

- **Roaming traffic is high revenue traffic and optimising the network for roamers is highly profitable**
- **The Roaming Analyzer focus on optimising and increasing roaming traffic**
 - **By analysing where roamers enter the network**
 - **By finding out where roamers fail to enter the network**
 - **By analysing of where roamers are taken from competitor networks**
 - **By analysing which roamers enter the network**
 - **By analysing of where roamers move in the network**
 - **By finding out where roamers generate traffic**
 - **By estimating where roamers are lost to competitors**

Major functions

- Cells with most incoming roamers
- Cells with roaming failures
- Cells where roamers enter from competitor network
- Cells where known roamers are entering a new LAC
- Cells where roamers generate traffic
- Cells where roamers are lost
- All reports can be filtered and combined by:
 - LAC, Cell, Operator, Latest network
- Coverage hole detection
- **The Roaming Analyzer is both a reporting and a trouble shooting tool**

Based on CDRs from Call Analyzer



Call Analyzer 1.2 - C:\ACA\record files\Demo 1 - A-Interface.rec

Call Analyzer - CDR Database

Call Records

LACOD	CELLID	LUP	LUP_TYPE	Attempt	Success	TMSI	IMSI
21772	12520	normal location upda		1	1	?	460001689682065
21772	12601	IMSI attach		1	1	00 10 B9 E5	?
21770	12003	normal location upda		1	1	00 10 BC 1B	?
21772	12601	IMSI attach		1	1	00 10 AB A7	?
21774	13060	normal location upda		1	1	?	460006008064284
21770	12090	normal location upda		1	1	?	460005698000036
21770	12090	normal location upda		1	1	00 10 B6 89	?
21770	12090	normal location upda		1	1	?	460005049023631
21772	12590	normal location upda		1	1	?	460005659060466
21770	12001	normal location upda		1	1	?	460005648050210
21770	12050	periodic location up		1	1	00 10 84 29	?
21770	12090	normal location upda		1	1	00 10 B4 5C	?
21770	12050	periodic location up		1	1	00 10 7D 5C	?
21772	12570	normal location upda		1	1	?	460005563003458
21772	12602	IMSI attach		1	1	00 10 9C BC	?
21770	12090	normal location upda		1	1	00 10 B5 BD	?
21772	12530	normal location upda		1	1	?	460009649000092

8668 Records

Export

Ok

- Easy to add new features
- Protocols already available
- User defined flows for generation of CDRs
- Data are available for detailed analysis
- Flows and events from the roaming analyzer are available for search and filter
- Fast implementation of new features

General functions

Apply filter for the last network the subscriber was active in (e.g. to see only subscribers taken from a competitor)

Apply filter for home network

Select function

Graphical results

Tabular results

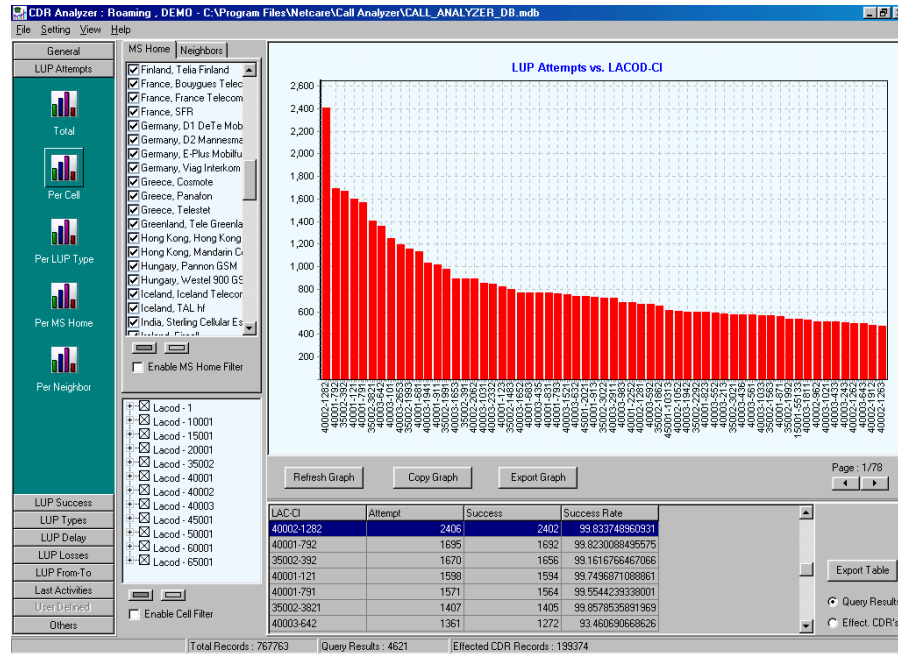
The screenshot shows the Netcare CDR Analyzer software interface. The main window is titled "CDR Analyzer - Roaming - DEMO - C:\Program Files\Netcare\Call Analyzer\CALL_ANALYZER_DB.mdb". The interface is divided into several sections:

- General:** Includes "MS Home" and "Neighbors" tabs. The "Neighbors" tab is active, showing a list of countries and operators with checkboxes. The "Neighbors" list includes: Austria, max.nobl Telec; Belgium, Belgacom Mobi; Belgium, Mobistar; Denmark, Sonofon; Denmark, Telenor Danmark; Denmark, Telsa Denmark; Estonia, Estonian Mobile; Finland, Sonera Corporat; France, Bouygues Telec; France, France Telecom; France, SFR; Germany, D1 DeTe Mob; Germany, D2 Mannesme; Germany, E Plus Mobilu; Germany, Viag Interticm; Greece, Panafon; Iceland, TAL H; Italy, Omnitel Pronto; Italy, Telecom Italia Mob.
- Filters:** Includes "All Origin to Target", "Neighbor to Target", "Enable Neighbor Filter", "Last Activities", "Use Derived", "Enable Cell Filter", and "Others".
- Data Table:** A table with columns "From To", "Attempt", "Success", and "Success Rate". The first row is highlighted in blue: "26201 to 50001-30942", "14", "5", "35.7142857142857".
- Graphical Results:** A bar chart titled "LUP Attempts vs. Neighbor Network to Target Cell". The y-axis represents the number of attempts (0 to 15), and the x-axis represents the neighbor network (e.g., 26201 to 50001-30942, 26201 to 50001-15231, etc.).
- Buttons:** "Refresh Graph", "Copy Graph", "Export Graph", "Export Table", "Query Results", and "Effect CDR's".
- Status Bar:** Shows "Total Records: 757763", "Query Results: 139", and "Filtered CDR Records: 268".

Apply filter for LAC or Cell ID

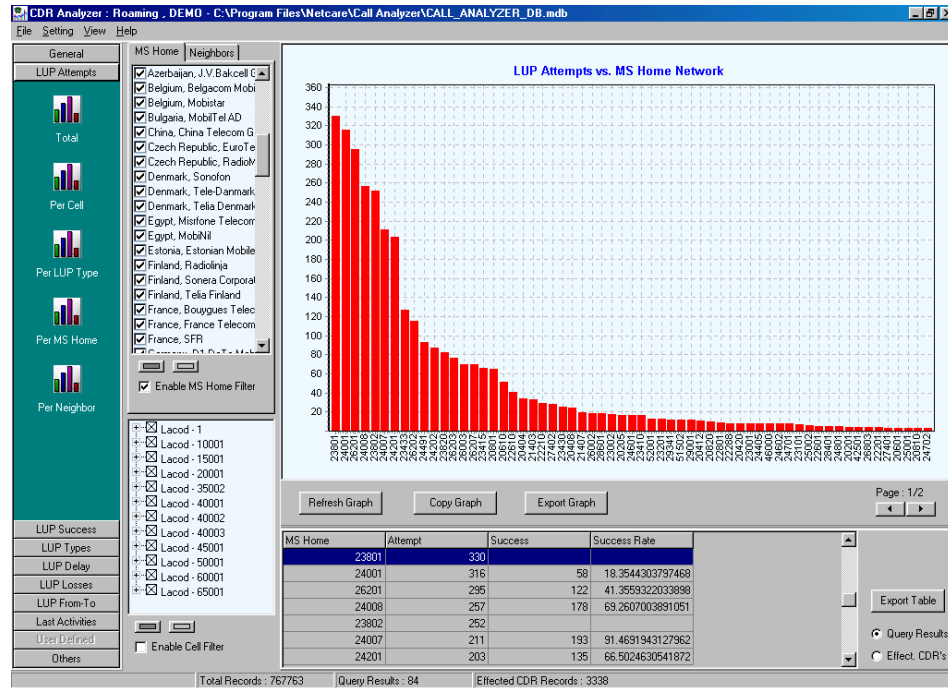
All filters can be activated for all reports

Detecting roamers - 1



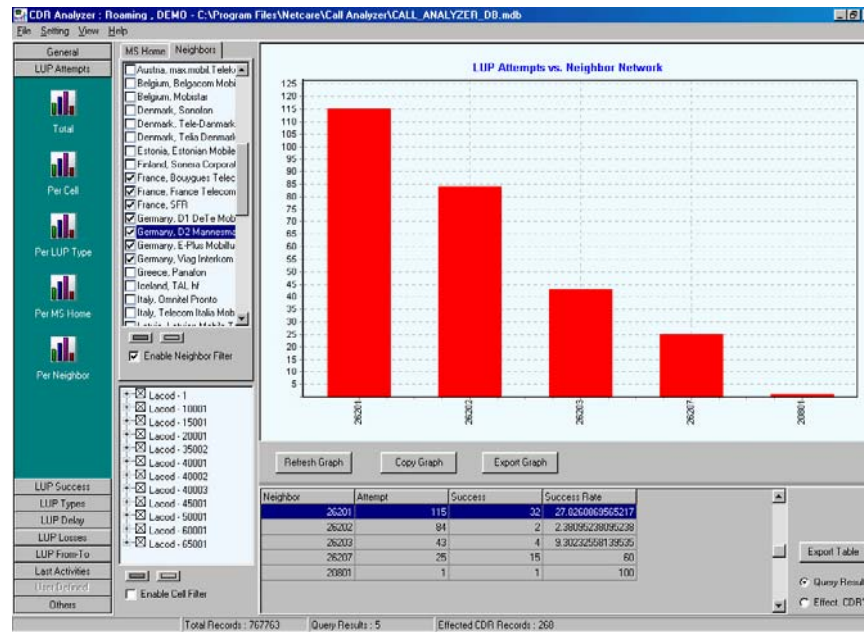
Identify where roamers enter the network

Detecting roamers - 2



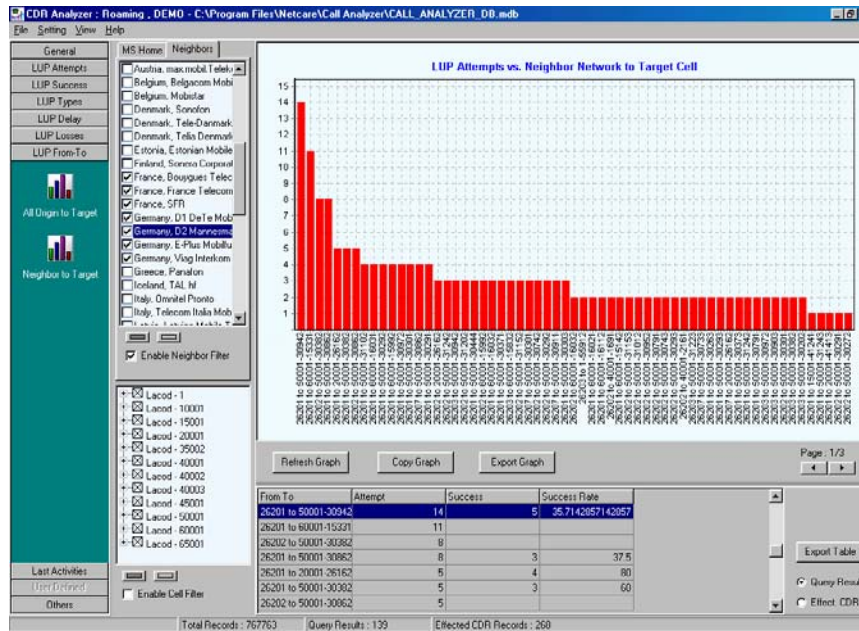
Find out which roamers that enter the network

Detecting roamers - 3



Use neighbour filter to select competitor networks and find out how many roamers you take from each of your competitors

Detecting roamers - 4



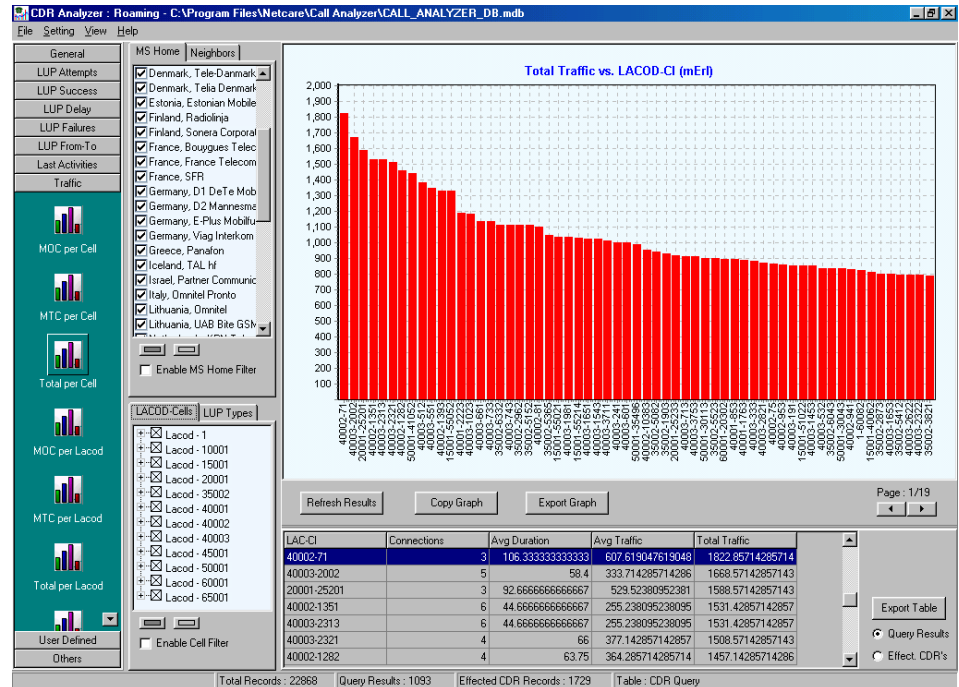
Detecting in which cells you take roamers from competitor's network

Roaming traffic

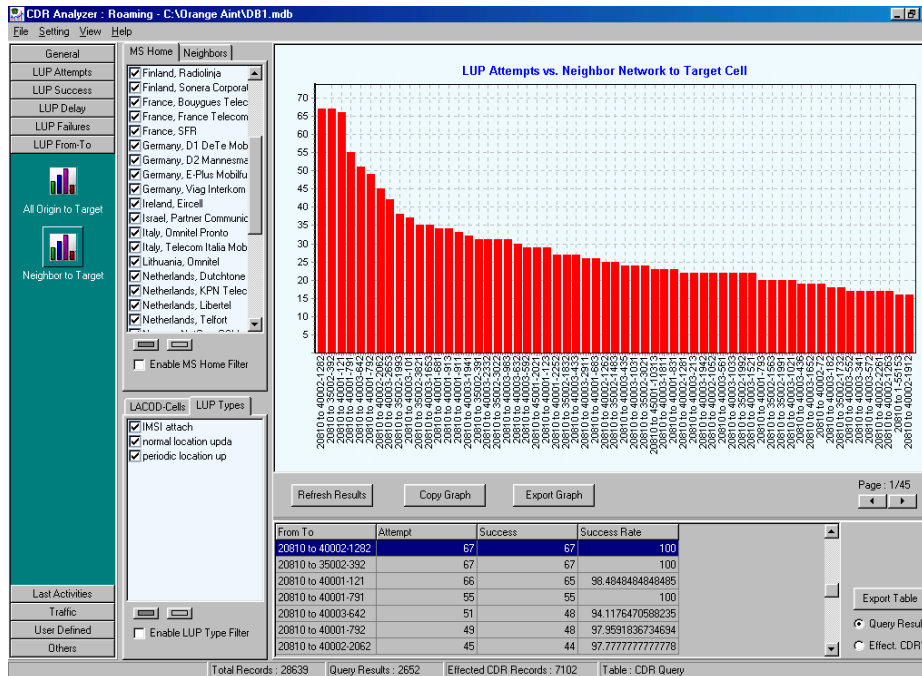
See the traffic generated by roamers

You can sort by:

- Home network
- Cell ID
- LAC
- MTC
- MOC
- Total
- Use all filters

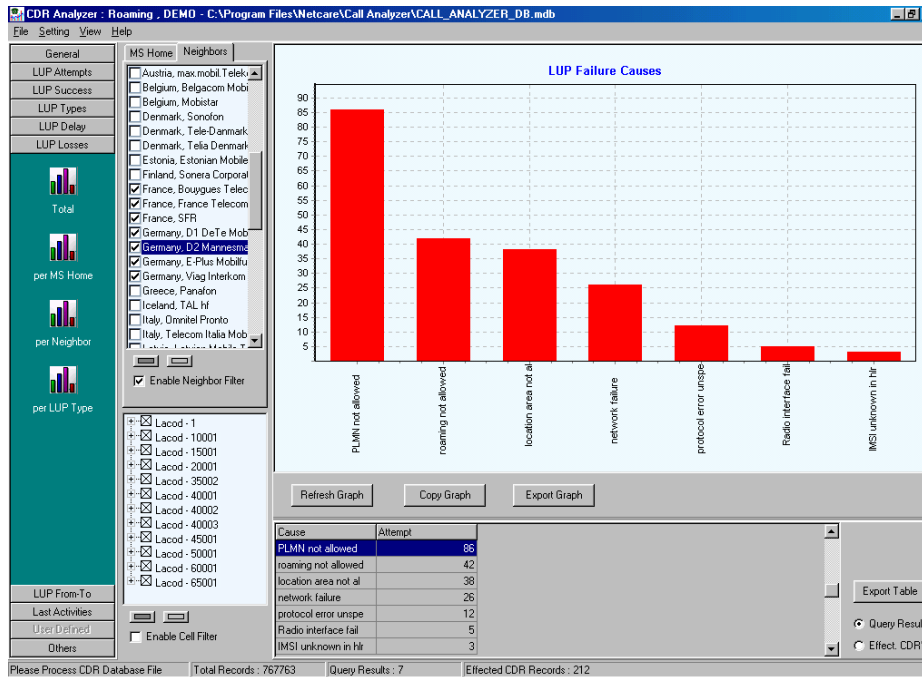


Roamers movements



See where roamers come from when they enter each cell

Roaming failures -1

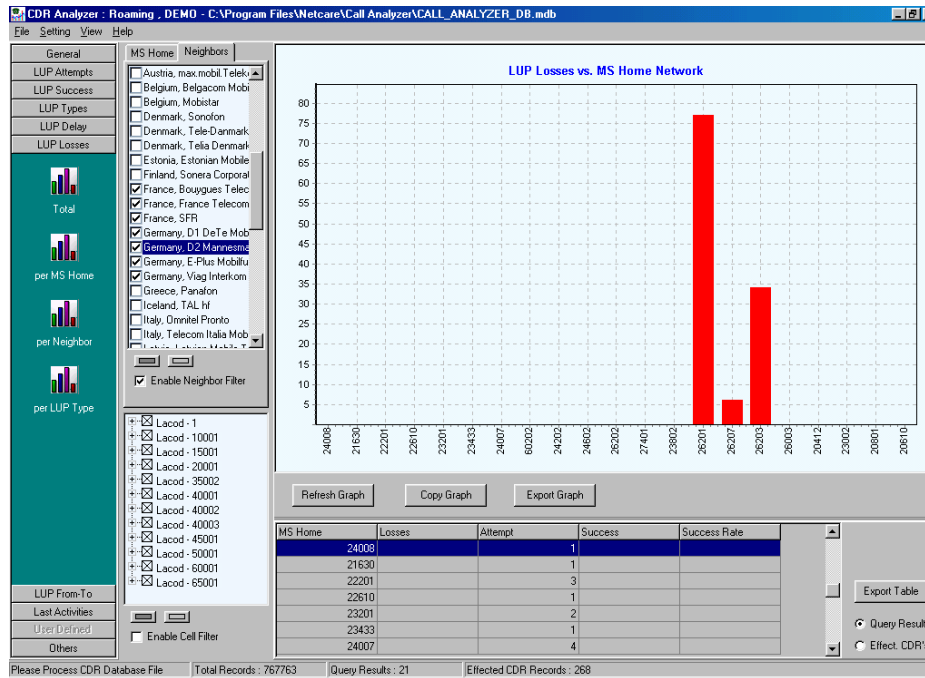


Location update failures show problems in entering the network

Apply cell filter to see where you have radio failures when roamers try to enter

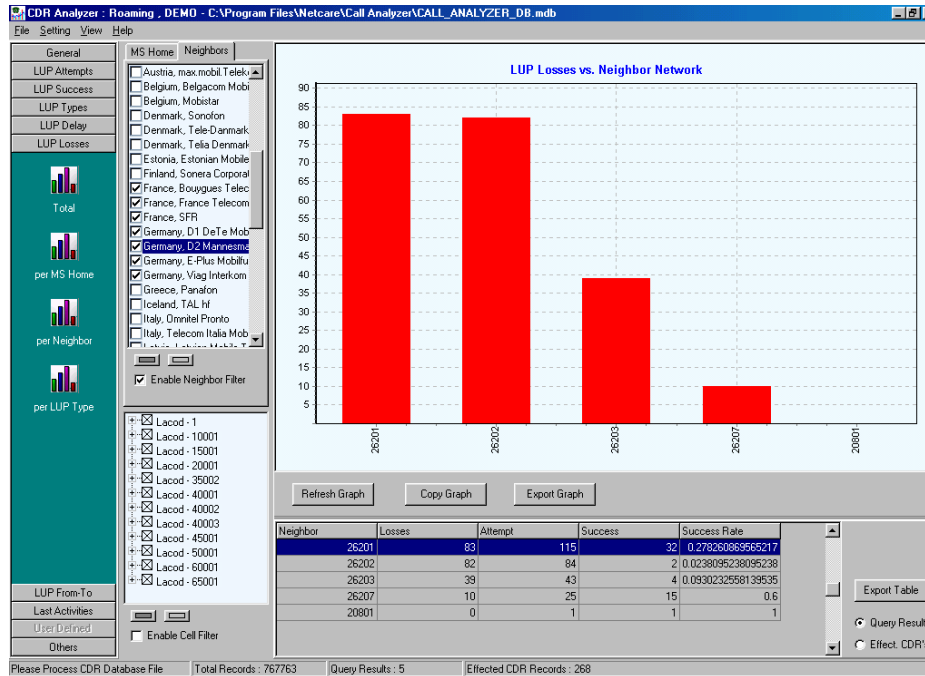
Apply home network filter to see which roamers that get roaming not allowed

Roaming failures - 2



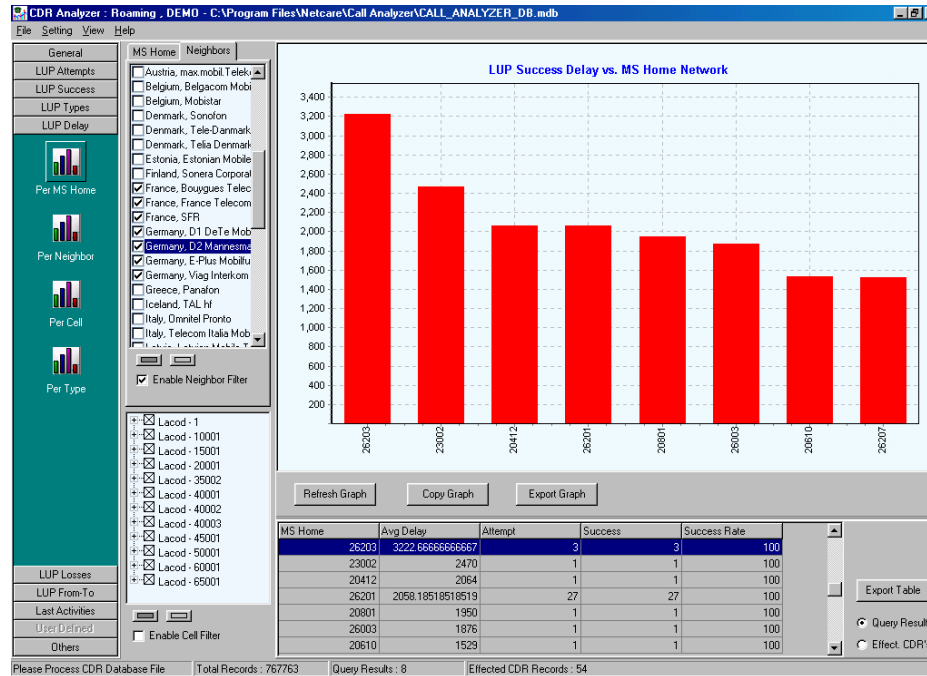
Sort roaming failures per home network to see if specific roamers cannot enter the network

Roaming failures - 3



Roaming failures per previous network (neighbour network) can show you if you have a problem taking roamers from your competitors. Apply cell filter to see where in the network the problem is

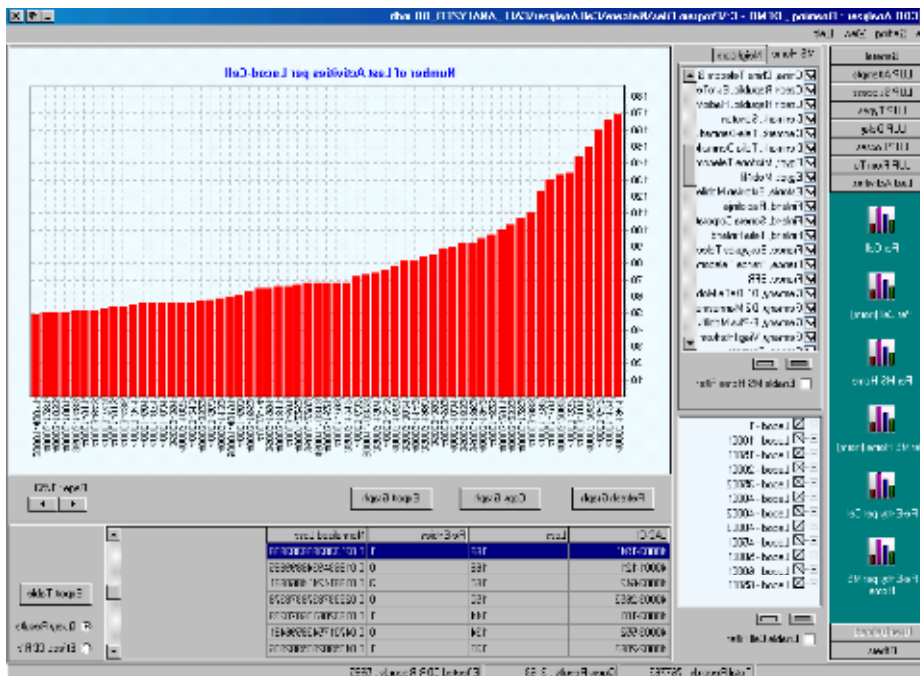
Roaming failures - 4



Measure the delay in location update per home network may indicate problems if an HLR have long response times

Loosing roamers

- The Roaming Analyzer links all TMSI to the IMSI if possible
- It detects in which cell each subscriber had the last activity
- It then detects if the subscriber enter the cell again from a competitor's network
- If a cell has many re-entries it is clear that roamers are lost in this cell and some of them can come back
- Use cell filter to find out in which cell you loose roamers and neighbour filter to find out to which competitor you loose them



Detection of coverage holes

- Coverage holes are detected as unanswered paging commands
- Roaming Analyzer finds in which cell the MS was active shortly before or after it did not answer the paging
- The time to search for the MS is user-definable

User Definitions

Queries Others

Own Network Code: 26202 Points per Page on Graph: 50

Backward Processing

Ignore Previous Processing Results

DAD 3.6

Coverage Hole Detection:

Threshold Observation Period: 40 seconds

Threshold Ignore Repeated Attempts: 30 seconds

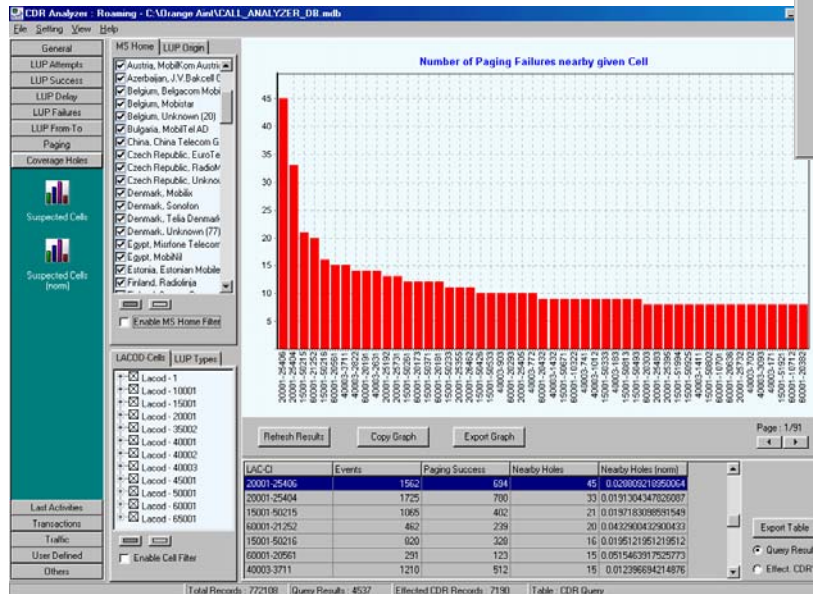
Doubleclick CDR:

Jump to Call Analyzer

Show Individual History

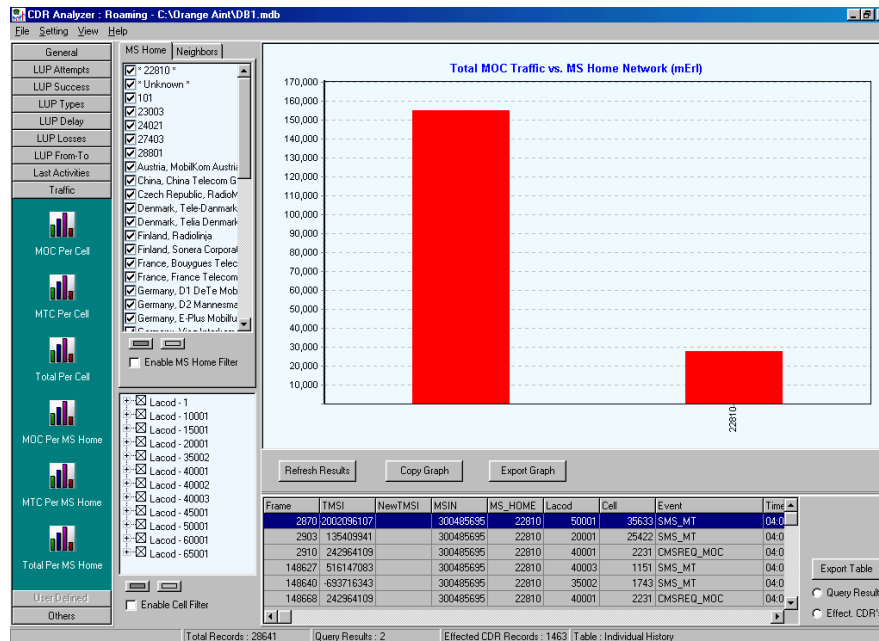
Reset Authorization

Apply Cancel OK



Subscriber trace

By a simple double click on a CDR record can give you a subscriber trace where you can follow all activities for a single subscriber



Protocol data

A double click on an activity will get you access to the full transaction or call trace in Call Analyzer where each message can be decoded

