

Netezza for Network Analytics

High Performance Analytics at Petabyte Scale



days for a single query

constant tuning

“ **Nearly 70%** of data warehouses experience performance-constrained issues of various types. ”

- Gartner 2010 Magic Quadrant

specialized resources required

months to deploy

The right data warehouse
is now mission critical.

Data continues to
expand exponentially.

Analytics are becoming more complex as
business demands faster answers.





TwinFin™

The true data warehousing appliance.

- Purpose-built analytics engine
 - Integrated database, server and storage
 - Standard interfaces
 - Low total cost of ownership
-
- Speed: 10-100x faster than traditional system
 - Simplicity: Minimal administration and tuning
 - Scalability: Peta-scale user data capacity
 - Smart: High-performance advanced analytics

Netezza unlocks incredible value from the data available to a CSP

Customer Experience

Subscriber retention
Subscriber acquisition
Service uptake
Social network
Improved campaign efficiency
Churn reduction
Price planning strategy



Revenue Assurance

Verify cost
Margin management
Validate revenue



Network Analytics

Network optimization



Perf analysis
Service Levels
Capacity Planning





Today's challenges

In a recent survey by Changeware, 10% of respondents indicated they planned to switch providers in the next 90 days.

If they churn, which other Customers will follow?

Acquiring a new customer can cost 6 to 7 times more than retaining an existing customer.



Today's challenges

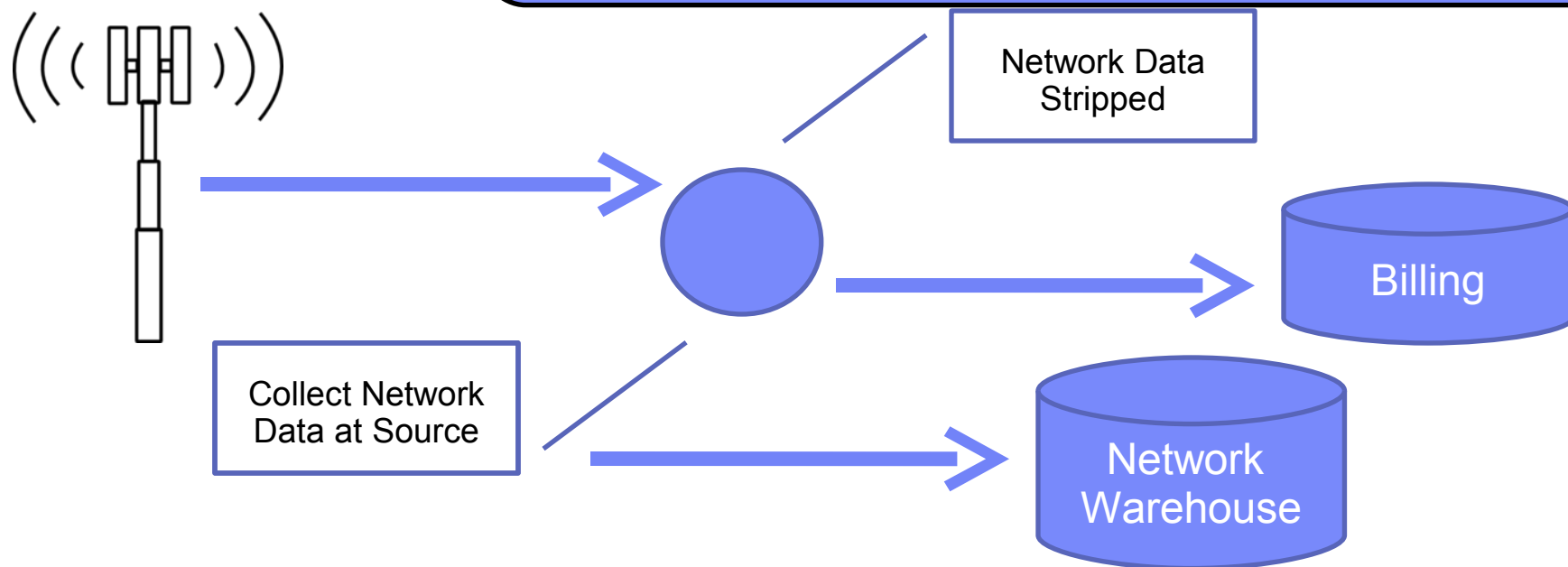
'Given the ubiquity of basic transport services and me-too nature of the telecom market , the customer experience is one of the last remaining opportunities for competitive differentiation'

Yankee Group.

An engineer at one of our customers wanted to know how certain type of handset affected performance of tower.

A marketing analyst also wanted to know how network performance affected their Customer Experience.

But how do we determine this?



Outcome: 10TB System grew to 1PB by 2010, with about 400 users querying calls and network data for troubleshooting and dozens of report extracts for handset performance.

Netezza Network Analytics Accelerator (NAA) Solution Overview

Dashboards, reporting, drill-down



IBM COGNOS 10



NETWORK ANALYTICS ACCELERATOR

Network intelligence models

Data
Foundation

Metrics

Trends and
Alerts

Exceptions

Workflow

Ad Hoc
Queries

ventraQ™

Network DWH & application deployment and configuration platform



Robust Network
Analytical
Applications

Proven Platform
for Data Mgmt,
Integration, BI,
Optimization,
User Experience

Voice

Data

Signaling
Data

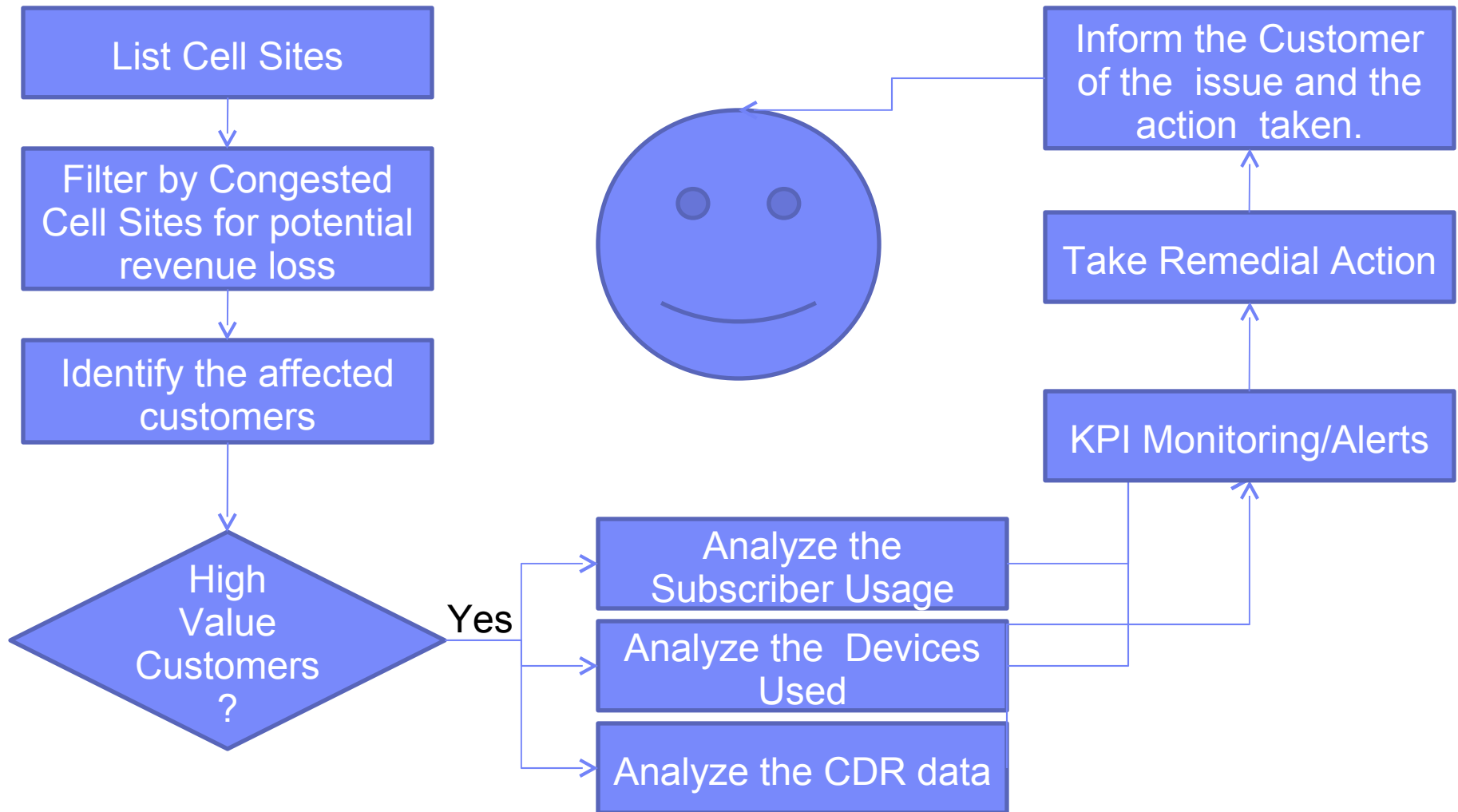
App
Server

Handset

Customer

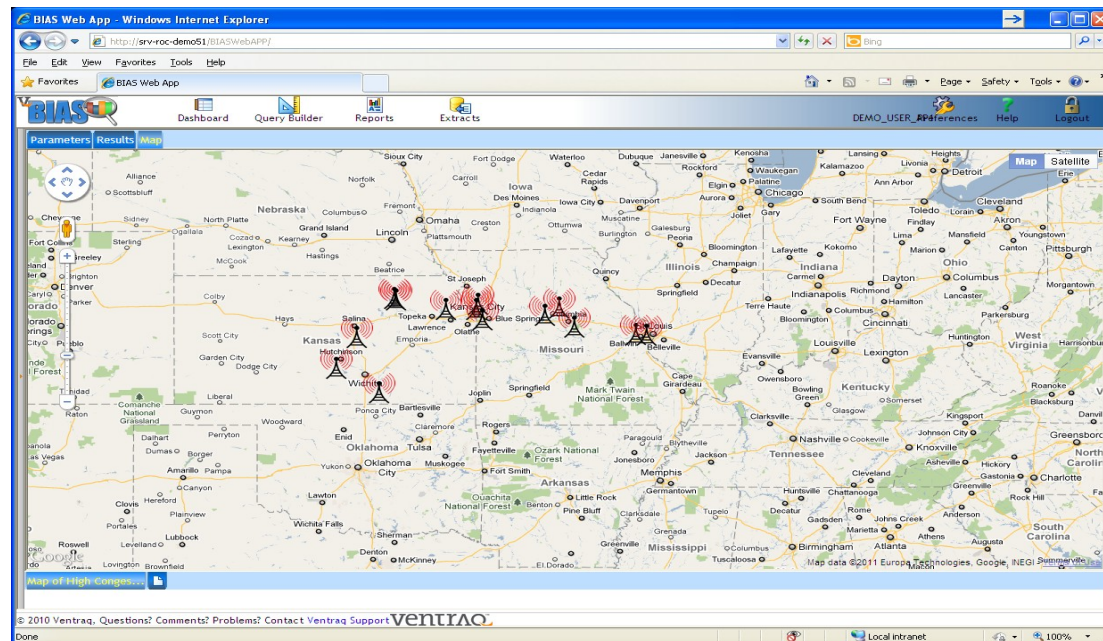
Product

Goal – Proactive Customer Experience Management



Network Analytics Accelerator (NAA) – Typical Scenario

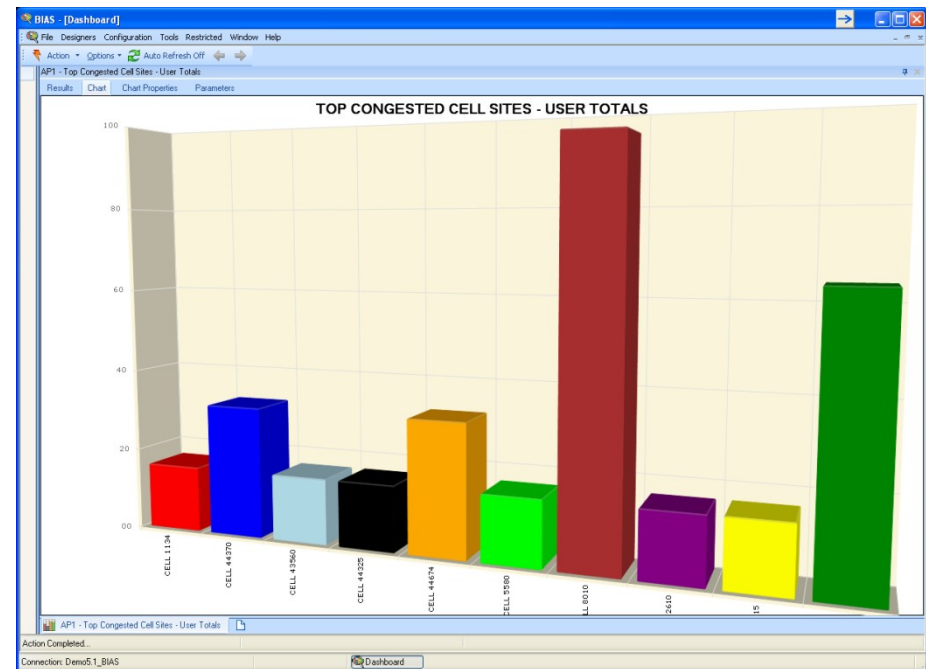
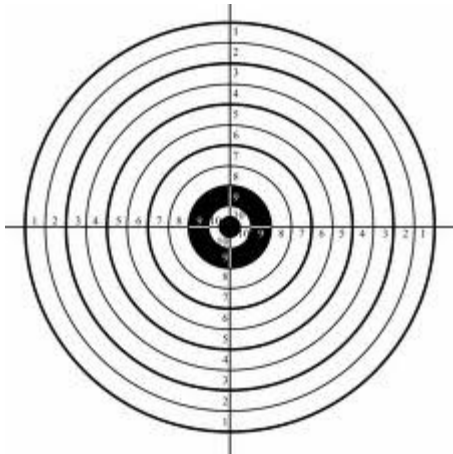
The Dashboard map provides a geographical visualization of the cell sites in the CSP's network. The ones shown in red are the cell sites with higher congestion and those are the ones we are interested in.



Network Analytics – Typical Scenario

We then use the Top Congested Cell Sites Chart to identify the 2 topmost congested cells.

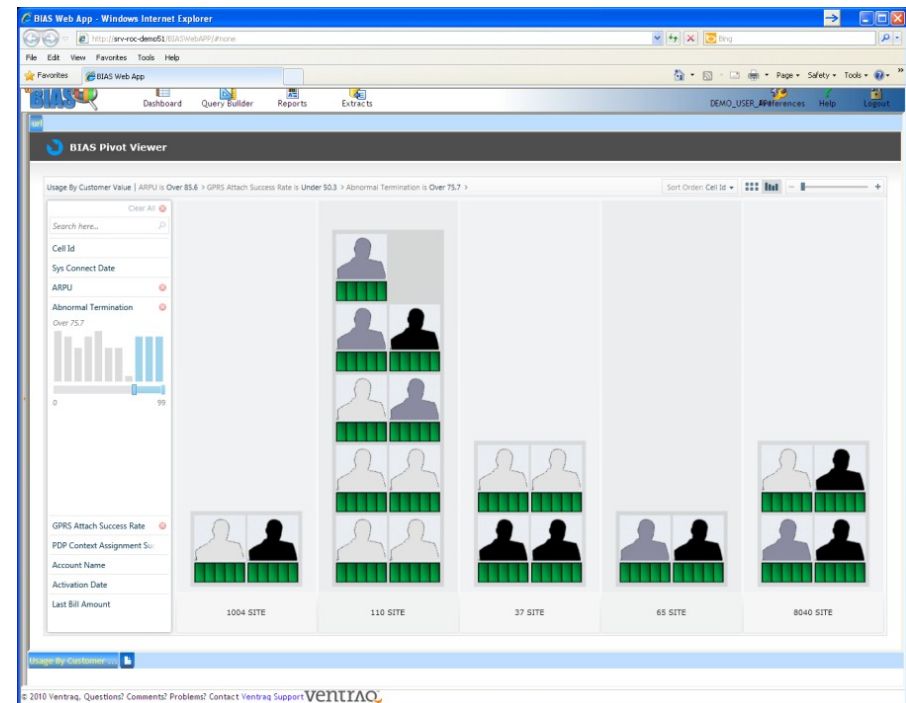
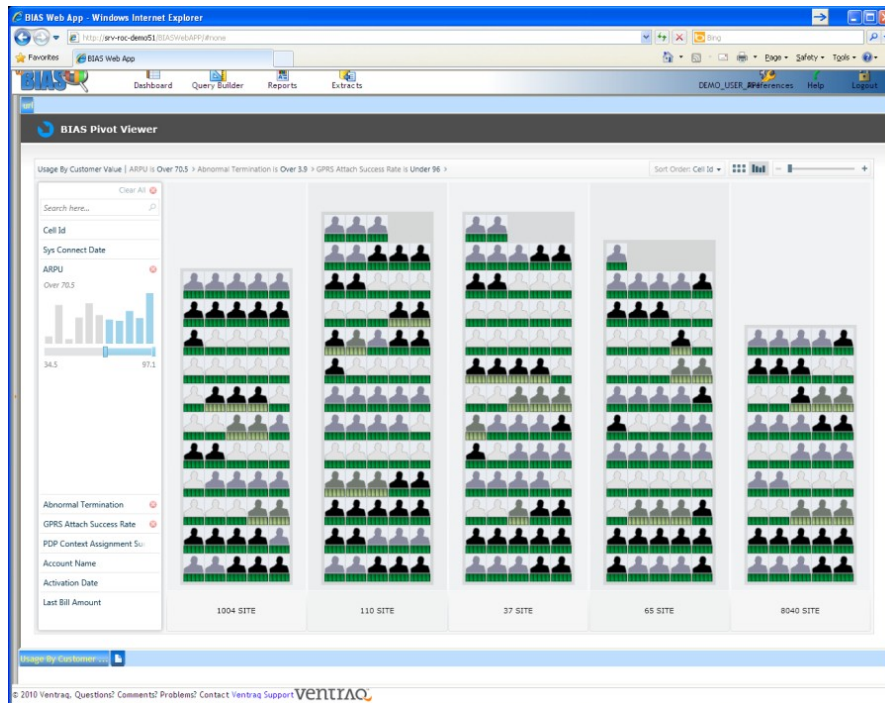
We find that our target cell sites are 8010 and 44674.



Top Congested Cell Site User Totals Chart

NAA – Typical Scenario

We then use the NAA “Pivot Table Viewer” to get clear insight into the highest ARPU Customers with the most dropped calls, to quickly focus in on these high value Customers.



NAA – Typical Scenario

This information is passed to the Technical Analysts who then use the 'Power User' interface to look at the detailed data to determine the cause of the dropped calls. This interface provides Drill Down Capabilities to get to the low level data like subscriber usage details, plans, devices and even look at the actual CDRs.

AP1 - Cell Site Traffic Study

Results Parameters Output Merged Code Operations Debug Messages XML

☐ Deselect All ☐ Grouping Export Refresh 500 Per Page

Fromdate	Thru date	Cell Tot Abnormal Termination Ranking	Cell Id	Cell Tot Abnormal Termination	User Total	User Total Churned Actual	User Total Churned Prediction
2011-01-01 00:00:00	2011-12-31 23:59:59	1	8060	275	5520	2510	2804
2011-01-01 00:00:00	2011-12-31 23:59:59	2	1374	139	10840	5309	5158
2011-01-01 00:00:00	2011-12-31 23:59:59	3	4004	80	3568	1755	1761
2011-01-01 00:00:00	2011-12-31 23:59:59	4	510	66	376	172	173
2011-01-01 00:00:00	2011-12-31 23:59:59	5	604	59	1360	683	662

Export
Data Options
Advanced
Drill

Devices
Subscribers
XGSN URR

AP1 - Cell Site Traffic Study

Results Parameters Output Merged Code Operations Debug Messages XML

☐ Select All ☐ Grouping Export Refresh 500 Per Page

Party Id	Parent Party Id	Account Id	First Name	Middle Name	Last Name	Gender	Status	From Dt	Thru Dt	Party Type Id	Party Type Desc	Party Category Id	Party Category Desc
273991		273991	Sarah		Dobson	F	A	06/25/2007		1	Individual	1	Postpaid
3107473		3107473	Monks		Diner	F	A	09/01/2004		1	Individual	1	Postpaid

AP1 - Cell Site Traffic Study

Results Parameters Output Merged Code Operations Debug Messages XML

☐ Select All ☐ Grouping Export Refresh 500 Per Page

Batch ID	Rec Num	Node ID	Record Type	SYS_CONNECT_DT	Cell Id	Slv Breach	Abnormal Termination	TAC	IMEI	IMSI	MSISDN
91318248	5129	TFHHT003	19	2/1/2011 2:38:56 PM	8060	0	0	52800715	5280071542375510	501471003031413	2159408142
91085514	7872	TFHHT003	19	1/31/2011 3:01:37 PM	8060	0	0	52800715	5280071542375510	501471003031413	2159408142
81271638	4386	TFHHT003	19	2/3/2011 8:51:15 AM	8060	0	0	52800715	5280071542375510	501471003031413	2159408142
91379328	5151	TFHHT003	19	2/1/2011 3:58:18 PM	8060	0	0	52800715	5280071542375510	501471003031413	2159408142
81388284	6752	TFHHT003	19	2/2/2011 5:02:29 PM	8060	0	0	52800715	5280071542375510	501471003031413	2159408142

Using the “Smart Query”, the user can drill all the way down to the individual Customers and the specific transactions on the cell sites in its target list.

NAA – Typical Scenario

Now that you have identified the cause of the dropped calls, you can then setup the alerts monitoring of the KPI by defining certain threshold values on the metrics. When the KPI thresholds are breached, the relevant group will receive an email prompting them to take remedial action. This in turn improves the Customer Experience.

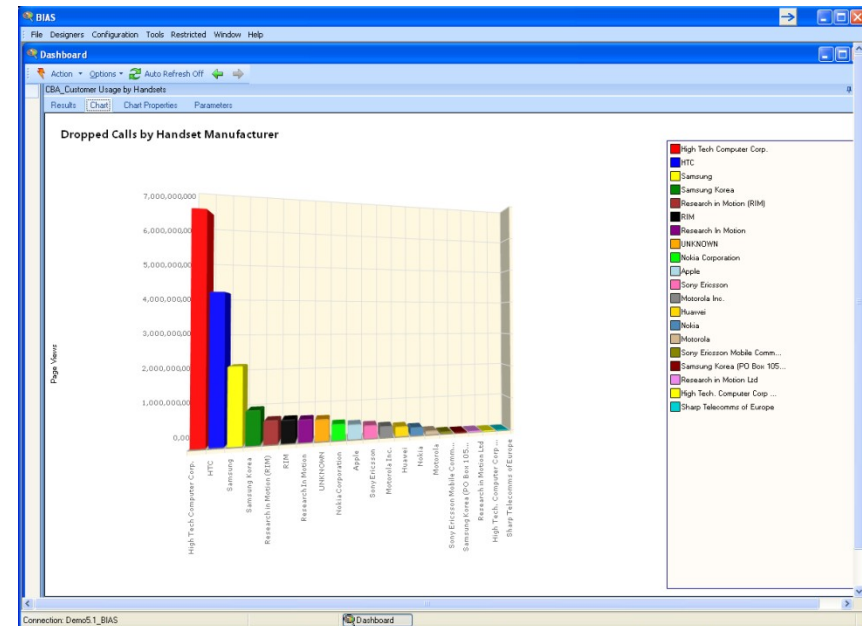
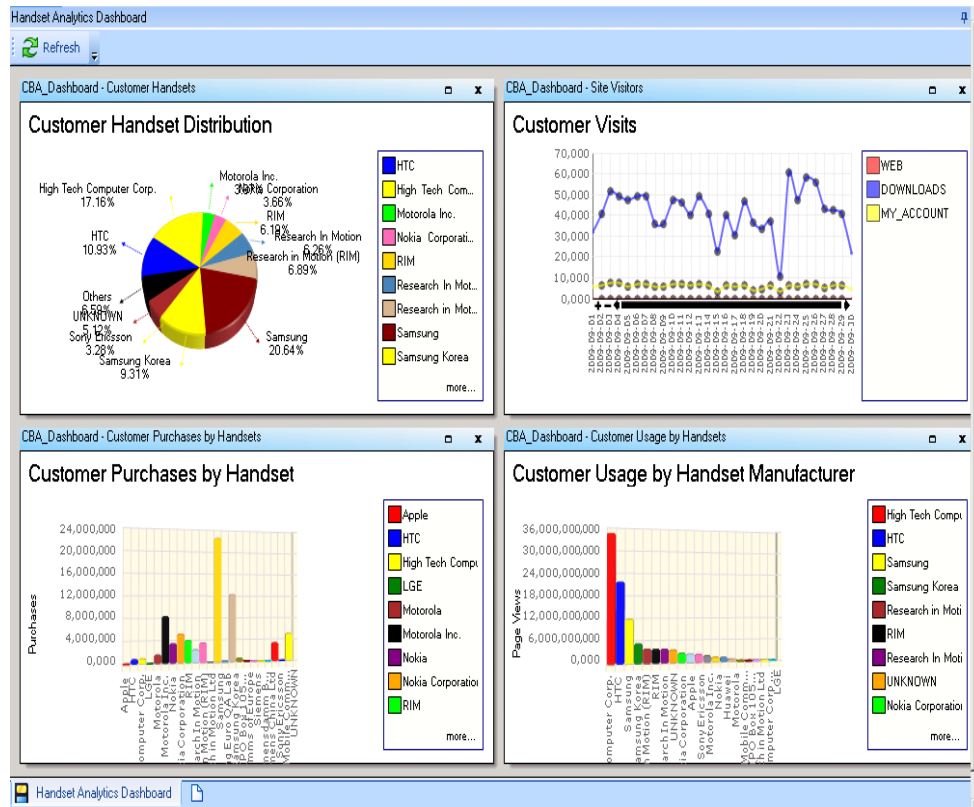
The screenshot shows the BIAS - [Alerts and Monitoring] application window. The interface includes a menu bar (File, Designers, Configuration, Tools, Restricted, Window, Help) and a toolbar. The main area displays a table of KPI data for various MSCs, filtered by 'Year - Month' (200904) and 'Day' (01). The table has columns for Summary, A Output, A Output Percent, A Output R5d Avg, C Output, C Output Percent, C Output R5d Avg, Errored, Errored Percent, Errored R5d Avg, Unbillable, Unbillable Percent, and Unbillable R5d Avg. The data is grouped by 'Element Grouping' (ABC) and 'Day' (01). The table shows data for MSC002 through MSC011, with a total row at the bottom. The status bar at the bottom indicates 'Total OK 111', 'Total Bad 21', 'Critical 21', 'Warning 0', 'LUT Critical 0', 'LUT Warning 0', 'Disabled 0', and 'Invalid Call 0'. The connection is 'BIAS Demo'.

Summary	A Output	A Output Percent	A Output R5d Avg	C Output	C Output Percent	C Output R5d Avg	Errored	Errored Percent	Errored R5d Avg	Unbillable	Unbillable Percent	Unbillable R5d Avg
Total	1,942,894	104.43 %	1,860,412.737	1,541,623	103.92 %	1,483,540.115	310	96.15 %	321	164,884.639	103.94 %	158,639.032
MSC002	17,621,576	98.46 %	17,896,584	30,908,504	108.62 %	28,454,536	0	0.00 %	0	2,420,034	101.60 %	2,381,874
MSC003	35,125,802	103.69 %	33,877,298	28,477,376	101.63 %	28,021,730	0	100.00 %	0	3,206,295	104.72 %	3,061,702
MSC004	49,224,053	100.99 %	48,743,860	34,866,340	98.92 %	35,246,728	6	0.00 %	0	3,964,362	100.48 %	3,945,282
MSC005	29,417,287	101.87 %	28,876,181	27,621,408	103.82 %	26,606,277	0	0.00 %	0	2,535,547	103.69 %	2,445,250
MSC006	11,827,223	99.20 %	11,922,086	24,242,989	98.50 %	24,612,444	0	100.00 %	0	1,204,732	100.76 %	1,195,686
MSC007	16,837,946	117.43 %	14,338,525	13,265,200	119.61 %	11,089,944	6	0.00 %	0	1,523,663	136.35 %	1,117,425
MSC008	16,636,856	100.21 %	16,602,071	11,240,019	95.68 %	11,747,742	0	0.00 %	0	1,319,241	99.04 %	1,331,965
MSC009	58,112,438	102.62 %	56,628,590	23,487,800	101.32 %	23,182,291	0	0.00 %	0	4,715,407	105.85 %	4,455,008
MSC010	36,160,815	106.96 %	33,806,742	16,409,829	104.28 %	15,736,901	0	0.00 %	6	2,412,888	103.92 %	2,321,841
MSC011	0	100.00 %	0	0	100.00 %	0	0	100.00 %	0	0	100.00 %	0

KPI Evaluator in NAA from Ventraq

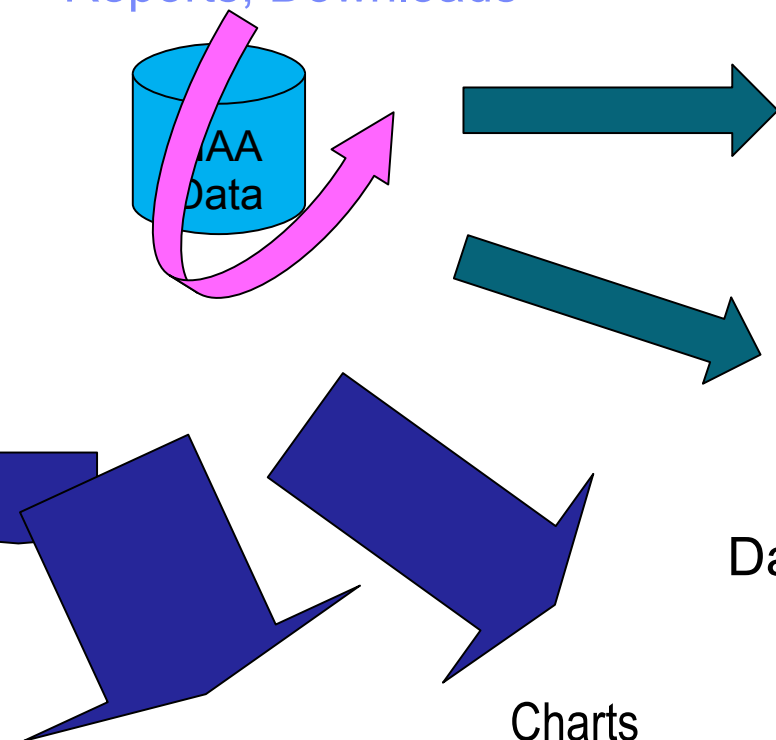
NAA - Handset Performance

The NAA also provides various KPI Dashboards and charts to monitor Handset Performance. These Dashboards are User Configurable.



NAA - Flexible Outputs

Various Reporting Options: Ad hoc Analytical Grid, Standard Reports, Downloads

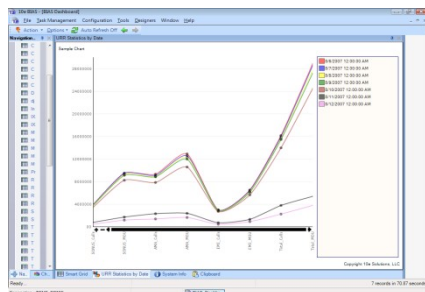


Smart Grid output
...save as Excel
spreadsheet
OR XML file

Web Based
Report
Viewer
Data Extracts

Charts

Email, Case
Management,
3rd Party
Reporting
Tool



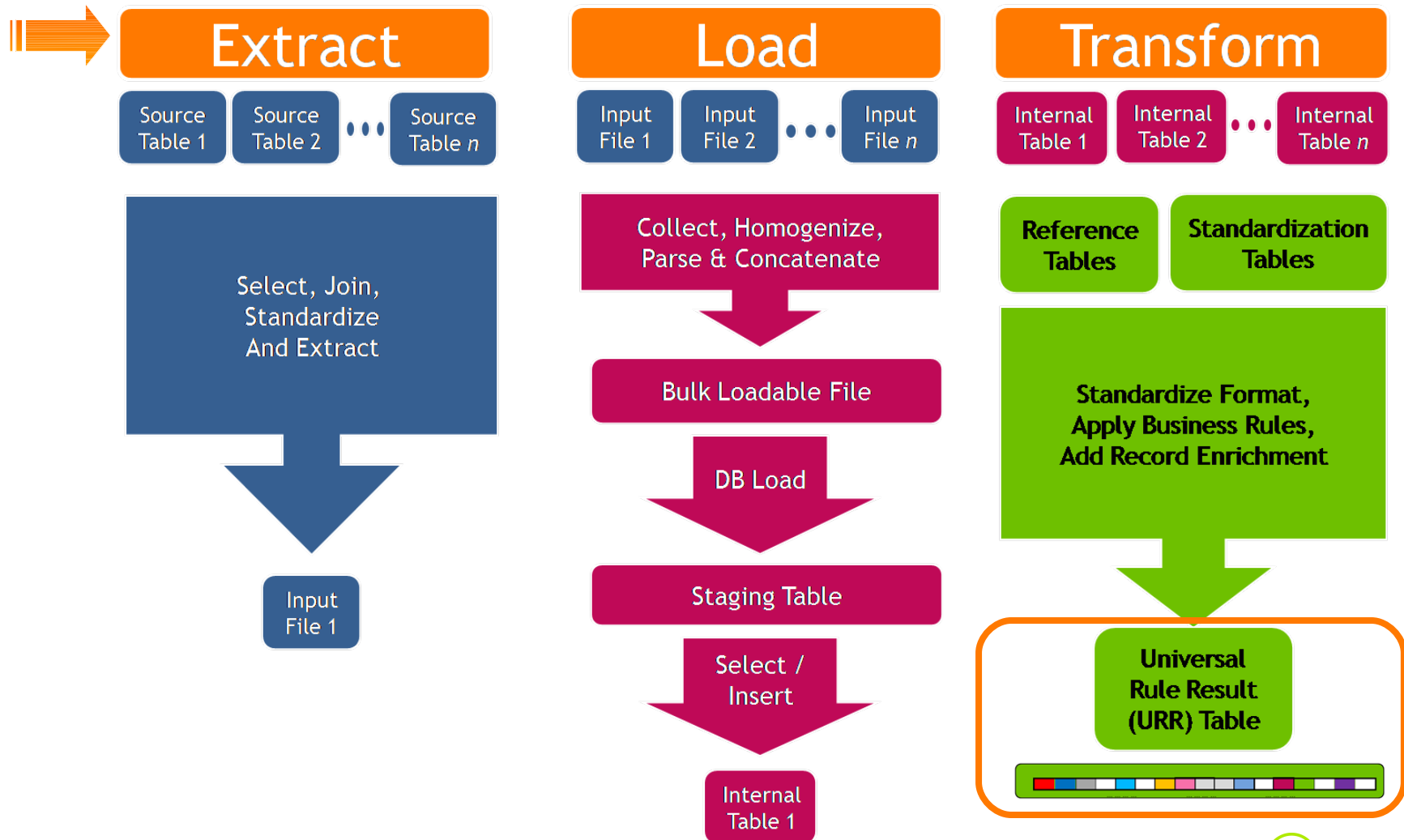
The screenshot shows the 'Web Report: Daily CDR Summary' interface. It displays a table with columns: RELEASE_DAY, SENSOR_ID, CALL_TYPE, TALK_DUR_MO, SWITCH_DUR_MO, and CALLS. The table contains data for various dates and sensor IDs.

RELEASE_DAY	SENSOR_ID	CALL_TYPE	TALK_DUR_MO	SWITCH_DUR_MO	CALLS
01/09/2006	867920	8	0	0	21
01/09/2006	867920	74	0	0	12
01/09/2006	867920	110	442	442	142
01/09/2006	867920	119	21174	21966	3029
01/09/2006	867920	950	3127	3127	508
01/09/2006	867979	6	23978	0	5411
01/09/2006	250774	6	81927	0	33777
01/09/2006	250774	119	5125	5616	2164
01/09/2006	250774	950	301	301	70
01/09/2006	819999	6	68429	0	30366
01/09/2006	867668	6	260663	0	88541
01/09/2006	867668	72	10	0	1
01/09/2006	867668	74	10459	0	2462
01/09/2006	867668	110	3128	3396	1398
01/09/2006	867668	119	22181	23717	5943
01/09/2006	867668	192	8801	0	2412
01/09/2006	867668	193	0	0	5
01/09/2006	867668	196	799	0	1036
01/09/2006	867668	197	160	0	197
01/09/2006	867777	6	18563	0	7045
01/09/2006	867777	950	165	165	52
01/09/2006	867920	6	164661	0	50968
01/09/2006	867920	119	22979	24762	7364

The screenshot shows the 'ReportViewer' interface displaying a table with columns: RELEASE_DAY, SENSOR_ID, CALL_TYPE, TALK_DUR_MO, SWITCH_DUR_MO, and CALLS. The table contains data for various dates and sensor IDs.

RELEASE_DAY	SENSOR_ID	CALL_TYPE	TALK_DUR_MO	SWITCH_DUR_MO	CALLS
1/8/2006 12:00:00 AM	867920	8	10	0	21
1/8/2006 12:00:00 AM	867920	74	0	0	12
1/8/2006 12:00:00 AM	867920	110	442	482	142
1/8/2006 12:00:00 AM	867920	119	21174	21966	3029
1/8/2006 12:00:00 AM	867920	950	3127	3127	508
1/8/2006 12:00:00 AM	867979	6	23978	0	5411
1/9/2006 12:00:00 AM	250774	6	81927	5616	33777
1/9/2006 12:00:00 AM	250774	119	5125	5616	2164
1/9/2006 12:00:00 AM	250774	950	301	301	70
1/9/2006 12:00:00 AM	819999	6	68429	0	30366
1/9/2006 12:00:00 AM	867668	6	260663	0	88541
1/9/2006 12:00:00 AM	867668	72	10	0	1
1/9/2006 12:00:00 AM	867668	74	10459	0	2462
1/9/2006 12:00:00 AM	867668	110	3128	3396	1398
1/9/2006 12:00:00 AM	867668	119	22181	23717	5943
1/9/2006 12:00:00 AM	867668	192	8801	0	2412
1/9/2006 12:00:00 AM	867668	193	0	0	5
1/9/2006 12:00:00 AM	867668	196	799	0	1036
1/9/2006 12:00:00 AM	867668	197	160	0	197
1/9/2006 12:00:00 AM	867777	6	18563	0	7045
1/9/2006 12:00:00 AM	867777	950	165	165	52
1/9/2006 12:00:00 AM	867920	6	164661	0	50968

NAA – Universal Rule Result



Use Cases:

Network Analytics
+ Customer Experience
+ Handset Analytics

T Mobile US

Situation & Effect | Improvement Metrics & Results

Network Analytics

• • **T** • • Mobile •

Vision

- Build a Network Analytic Platform by collecting network events on daily basis (1.6 billion in 2007, 8 billion in 2010, 17 billion in 2011)
- Improve customer experience, optimise network and assess handset performance and usage

Effect

- Business users embracing greater, enhanced analytic capabilities as platform is rolled out across a growing user base

Results

- **Data quality improved** to 99.99+%
- **Savings of over \$6m+ annually** on cost optimisation of network
- **Savings of between \$1m to \$2m annually** from just in time capacity investment
- Adhoc network and traffic analysis **effort reduced** to 12 person months/annum from 120 person months/annum
- **8:1 reduction** in DWH administrative staff
- Enterprise-wide use of network data with over 1400 users and supporting 14 downstream systems

Use Cases:

Network Quality

Sprint

Situation & Effect | Improvement Metrics & Results

QoE Analytics



Vision

- Collect, geo-locate, map, and report PCMD data to reduce operating costs, increasing network capital efficiency (optimize current hardware and better planning for new hardware)

Effect

- Reduced work to the field by "First Call Resolution", improved triage and increased remote fixes, better screened and more actionable than trouble tickets.

Results

- Simplify RF Engineering process for troubleshooting poorly performing cells to increase network quality
- Collection of 3G1X and EVDO PCMD data for Lucent, Nortel, and Motorola on an hourly basis with a 14 day sliding window
- Location-based analysis of call attempts, drops & execution **per user**; dropped call analysis **per handset type**; **proactive notice** of service issues to reduce churn
- **\$100M savings** in 100 days
- **\$3M operational savings** per year

Use Cases:

Revenue Assurance

Verizon

Situation & Effect | Improvement Metrics & Results

Cost Analytics



Situation

- Long dispute cycles with other carriers
- General need for a common high performance CDR repository and common reporting

Effect

- Inability to correctly validate carrier invoices
- Limited capability to analyze usage for margin and cost optimization
- Unable to process volumes of usage data for least cost routing system

Results

- **Faster resolution to carrier disputes** – from months to days
- Less time spent gathering data, more time spent on analysis
- **Margin and cost optimisation** realised
- **More accurate, more responsiveness** least cost routing realised
- Savings realised to date: **\$25 million - \$30 million**

Summary

The NAA transforms the mountain of network performance data into usable bytes of specific KPI's in order to identify problems in the network.

By providing this analysis, the NAA assists the CSPs in Proactively identifying those Customers with a less than acceptable Customer Experience, particularly those Customers with High APRU. Thus reducing churn and maintaining and increasing Revenue.





Test Drive TwinFin

Your Data. Your Site. Our Appliance.

