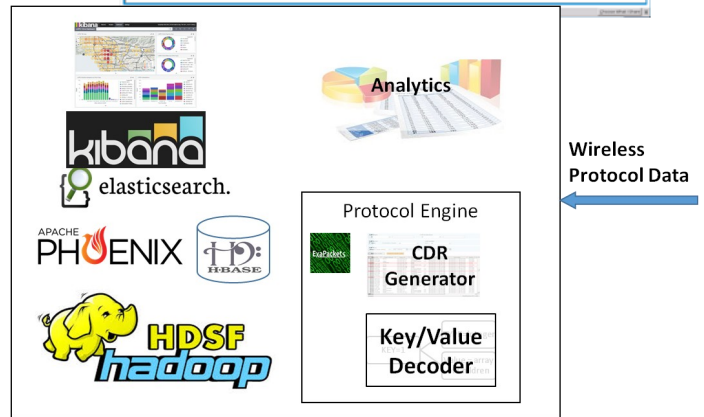
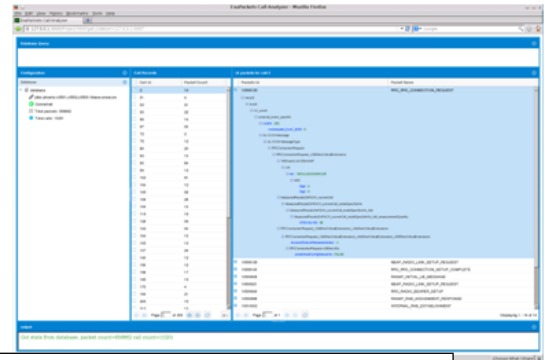


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ExaPackets Wireless Big Data is a high performance and scalable Hadoop based platform that allows storing billions of protocol packets and other logs, deriving CDRs from 3G and 4G wireless protocol packets. The platform includes a call analyzer, search engine, reporting, charting and analytics module to facilitate visualization of data and root cause analysis.

Product Overview

- Store billions of rows of logs and protocol data.
- Complete support for 3G and 4G protocols.
- Call trace engine groups the wireless packets by calls and creates Call Data Records.
- Visualize and map data interactively.
- Correlate data, e.g., failures against cell identifiers .
- The system provides processing power of 75000 records per second on a single server.
- The solution provides 14x increase in ETL using optimized Java Native Interface for C++.
- Fully automated ASN.1 and NAS compiler, decodes protocol with no manual coding.
- Ansible provide full configuration and installation of platform on a local cluster of servers or cloud requiring only SSH.
- Web based user interface allows user to run the software without any program installation.



Performance on a single server for 15 minutes of RNC Data

Server Specification

Intel Dual Xeon E5-2630 V3 2.5 GHz 8 Core, 64 GB RAM
45 Million records, 3.5 GB raw data

| | |
|---------------------------------------------------|--------------------------|
| Extraction, Decode, Load, Index Time | 675 seconds (11 minutes) |
| Counting Packets (all rows) | 283 ms |
| Fetching Packets for a given CDR | 200 ms |
| Cloud Deployment of a cluster of 3 servers | 90 seconds |

| Operation | ExaPackets | HBase Map/Reduce | Comaprison |
|----------------------|-------------|------------------|--------------|
| Bulkload to database | 339 seconds | 4865 seconds | 14x faster |
| Packet Row Count | 283 ms | 692 sec | 2445x faster |
| Fetch CDR Packets | 200 ms | 241 seconds | 1205x faster |

Supported Protocols

| LTE 4G | | UMTS 3G | |
|--------|-------------|---------|-------------|
| RRC | 3GPP 36.331 | RRC | 3GPP 25.331 |
| S1AP | 3GPP 36.413 | NBAP | 3GPP 25.433 |
| X2AP | 3GPP 36.423 | RANAP | 3GPP 25.413 |
| NAS | 3GPP 24.301 | RNSAP | 3GPP 25.423 |
| | | PCAP | 3GPP 25.453 |
| | | SABP | 3GPP 25.419 |
| | | NAS | 3GPP 24.008 |

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GUI Features

Fully web based

Expandable panes efficient presentation with minimum clutter.

Packet display expands and collapses to allow more efficient use of display space.

The screenshot displays the ExaPackets Call Analyzer interface. On the left, the 'Database Information' pane shows connection status and statistics: 'Total packets: 656862' and 'Total calls: 10201'. The 'Call Records' pane shows a table of call data:

| Call Id | Packet Count |
|---------|--------------|
| 2 | 14 |
| 31 | 4 |
| 32 | 21 |
| 33 | 22 |
| 64 | 14 |
| 67 | 30 |
| 72 | 2 |
| 75 | 12 |
| 89 | 20 |
| 108 | 28 |
| 109 | 13 |
| 116 | 16 |
| 128 | 36 |
| 132 | 30 |
| 134 | 13 |
| 135 | 12 |
| 137 | 24 |
| 143 | 12 |
| 150 | 12 |
| 158 | 17 |
| 165 | 15 |
| 173 | 4 |
| 199 | 21 |
| 205 | 15 |
| 919 | 19 |

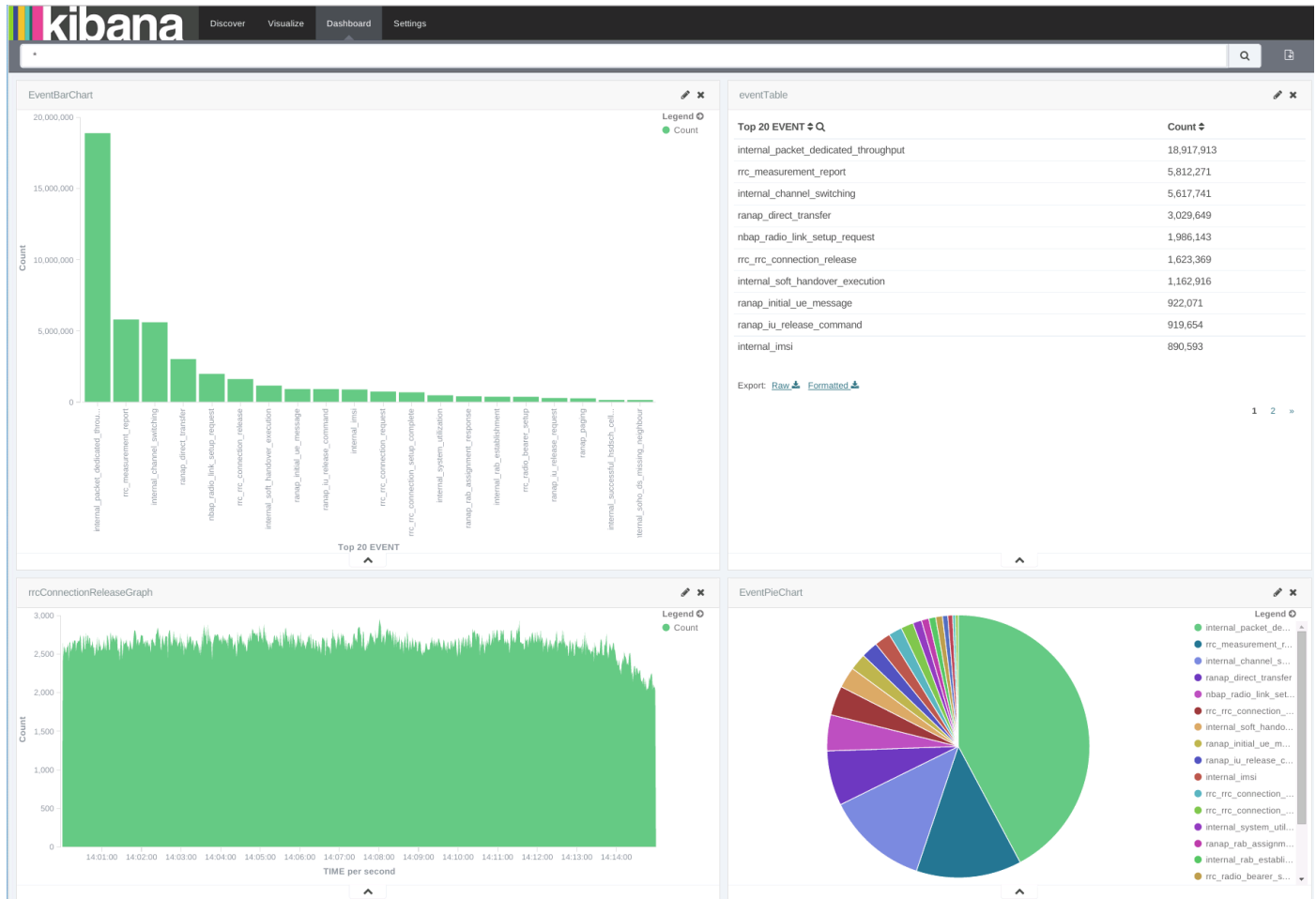
The main 'Packet Type' pane shows a tree view of protocol details for a selected packet (10508125). A red box highlights the following packet types:

- NBAP_RADIO_LINK_SETUP_REQUEST
- RRC_RRC_CONNECTION_SETUP_COMPLETE
- RANAP_INITIAL_UE_MESSAGE
- NBAP_RADIO_LINK_SETUP_REQUEST
- RRC_RADIO_BEARER_SETUP
- RANAP_RAB_ASSIGNMENT_RESPONSE
- INTERNAL_RAB_ESTABLISHMENT

| Packet Id | Packet Type |
|-----------|-----------------------------------|
| 10508126 | NBAP_RADIO_LINK_SETUP_REQUEST |
| 10508140 | RRC_RRC_CONNECTION_SETUP_COMPLETE |
| 10509908 | RANAP_INITIAL_UE_MESSAGE |

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The platform is integrated with Elasticsearch and Kibana allowing user to search and visualize the data interactively. The visualization includes, graphs, charts and geo-maps. All the visualization can be placed in a dashboard. The dashboard allows specification of threshold and monitoring of SLAs.



source

| | | | |
|-----------------|-----------------------------------|---------------------------------------------|-------------|
| SEQ: 20,001,462 | TIME: June 4th 2014, 14:00:01.270 | EVENT: INTERNAL_CHANNEL_SWITCHING | _id: AU62ja |
| SEQ: 20,000,005 | TIME: June 4th 2014, 14:00:00.792 | EVENT: INTERNAL_PACKET_DEDICATED_THROUGHPUT | |
| SEQ: 20,000,017 | TIME: June 4th 2014, 14:00:00.714 | EVENT: INTERNAL_PACKET_DEDICATED_THROUGHPUT | |
| SEQ: 20,000,022 | TIME: June 4th 2014, 14:00:00.797 | EVENT: INTERNAL_PACKET_DEDICATED_THROUGHPUT | |

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Hadoop Features

Hadoop and Yarn version 2.7.0
Hbase version 0.98.9
Apache Phoenix version 4.3.1
Hive version 1.2.0
Pig version 0.14
flume version 1.6.0
Kafka version 0.8.1
Storm version 0.9.5
Elasticsearch 1.6.0
Kibana 4,1,1