



# IntelliJudge LTE Analyzer

## IntelliJudge: The next level of LTE testing

Sanjole's WaveJudge revolutionized wireless development and interoperability testing by providing visibility into the interaction between PHY and protocol layers and the flexibility of a software PHY that can quickly adapt to changes in specifications. The WaveJudge can trigger on simple physical layer events to rapidly locate problem areas and cut troubleshooting time from hours to minutes.

The IntelliJudge takes this unique capability to the next level by taking it to the next layer – real-time analysis and storage of PHY and protocol interactions along with real-time triggering on lower and upper layer events, errors, messages, and message content. The result is the powerful ability to isolate problem areas regardless of the layer in which they occur.

This capability is increasingly important as LTE matures and development moves beyond establishing a transport to delivering services over the medium. This means you can harness the intelligence of the IntelliJudge to capture the precise moment when a problem occurs and correlate the messages from all layers to get a full picture of the anomaly.

## Intelligent Capture: Quantity and Quality

A capture gives you visibility into events and protocol exchanges to reveal what went wrong or verify that things went right. IntelliJudge streams PHY information and upper-layer frames from any number of UEs in real time through a USB, SRIIO or Ethernet port to an external disk, allowing you to capture days of traffic, limited only by the size of the external disk.

Captures can be examined for upper-layer protocol analysis, LTE-specific PHY analysis, or trend analysis over hours or days of operation. Mine statistics from the data or evaluate performance metrics, including throughput, scheduling, and HARQ.

Another important use of a capture is to inspect a specific frame or group of frames to discover why the issue, such as a dropped call or a hand-over failure, occurred. IntelliJudge significantly reduces troubleshooting time through triggers and targeted capture.

With targeted IQ capture, IntelliJudge detects when a user-defined event of interest occurs and triggers a capture of raw IQ data surrounding the event. Intelligent capture frees you from waiting for a large capture to be decoded and the additional time required to wade through

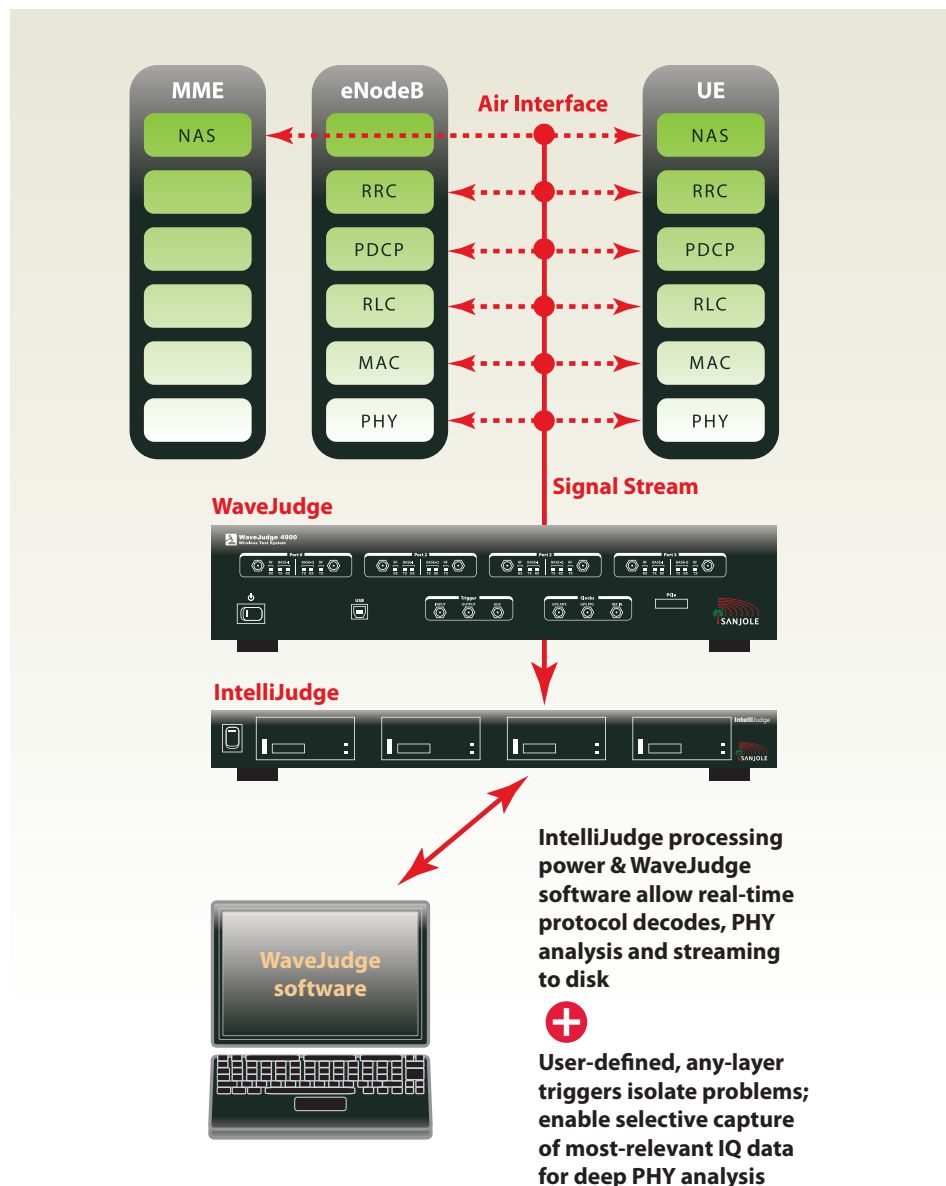


*The IntelliJudge LTE analyzer enables real-time decoding, filtering and triggering on all layers*

the mountain of results, searching for the few milliseconds that matter. The IQ data can be uploaded to take advantage of the deep Layer 1 analysis available only in the WaveJudge.

## How It Works

The IntelliJudge accepts raw digital IQ data streamed from the WaveJudge and handles PHY layer processing in real time to produce MAC-





*The IntelliJudge pairs with Sanjole's WaveJudge to take LTE testing to the next level*

layer and PHY-layer data and measurements. The information is streamed to an external PC hard drive. The raw IQ data can also be captured from the WaveJudge to take advantage of its unique post-capture PHY analysis capabilities.

The IntelliJudge architecture combines FPGAs and DSP cores to achieve unparalleled speed and the flexibility to support a wide range of technologies and applications, protecting your investment.

### Applications for the IntelliJudge

The IntelliJudge can be used to accelerate testing in a wide variety of situations.

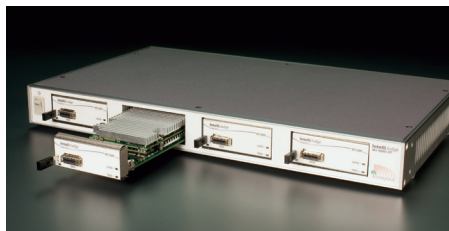
- Chart a specific UE (or a group of UEs) to identify when it enters the network, how long it takes to enter, and its performance after it has joined, including throughput and errors.
- Identify a handover for a single UE (or a group of UEs) and chart the progress of the handover.
- Perform long-term performance analysis of wireless networks.
- Track user activity to ensure proper network build out.

### Benefits of the IntelliJudge

- Reduce development costs and improve time to market by troubleshooting faster
- Gain accurate knowledge of what really is being sent OTA
- Isolate problem areas regardless of the layer they happen on
- Get visibility into problems by capturing targeted raw IQ data
- Understand the root cause of complex problems that span multiple layers
- Educate multiple design teams on interaction of layers
- Improve TCO and ROI on wireless test ports

### Features of the IntelliJudge

- Real-time analysis of protocol and PHY layer interactions
- Stream minutes, hours or days of L1 information and MAC data to external applications
  - WaveJudge for deep OTA analysis
  - PC hard drive for correlation with other EPC analysis tools



*The IntelliJudge architecture combines FPGAs and DSP cores to achieve unparalleled speed*

- Trigger and filter in real time
- Capture raw IQ data around a trigger point
- Decode and display all LTE layers, including NAS, RRC, PDCP, RLC and MAC
- Validate and track ARQ and HARQ transmissions
- Track DL/UL data transfer (U-Plane) for multiple UEs
- Decode and analysis of all UL PHY channels, including PRACH, PUSCH, PUCCH
- Analysis of control and user plane messages
- Decode and filter for multiple UEs
- Ciphering support for higher layers

#### Real-time triggers from PHY and upper layers

- Any message, message content, and field values inside messages
- Protocol and PHY errors, including CRC, RCE, and power

#### Capture

- Stream L1 information and upper-layer traffic to HDD for days
- Isolate anomalies and preserve IQ data for deep analysis of all layers
- Stream Uu MAC data to X2, S1, S5, S6a analysis engines for complete network correlation
- Correlate across the network using GPS timing

#### Advanced configuration

- MIMO of 2 and 4 antennas per chassis
- Intra- and inter-frequency handover for SISO and MIMO
- Diversity support for DL/UL

#### RF WaveJudge support

- Support all bands with frequency support from 400 MHz – 4 GHz
- Monitor UE RX signals from eNB with superior range -98.4 dBm to +22 dBm

#### PHY data

- Track global Cell ID and center frequency offset
- Collect and trigger from RCE, CRC errors and power per TB
- Monitor DL CFI, DCI scheduling and PHICH
- Monitor UL UCI (CQI, RI, ACK, scheduling requests), PRACH and sounding Reference signals

### Call for a Demonstration

To inquire about a demonstration or for more information about the IntelliJudge, please call Sanjole at 1-808-457-1452 or email [sales@sanjole.com](mailto:sales@sanjole.com).

### About Sanjole

Sanjole is a leader in wireless testing with expertise in innovative wireless technology. Sanjole provides problem solving capabilities from inside the wireless network through deep analysis tools that provide visibility into events spanning multiple layers. Sanjole has been involved from the very beginning of WiMAX and LTE as a test vendor in the first plugfests for wireless devices. Our work with the WiMAX Forum and 3GPP, and extensive experience in interoperability trials, gives Sanjole insight into the complex technical issues specific to the wireless community.

Sanjole Inc.  
2800 Woodlawn Drive, Suite 271  
Honolulu, Hawaii 96822

e-mail: [sales@sanjole.com](mailto:sales@sanjole.com)  
call: 808-457-1452

[www.sanjole.com](http://www.sanjole.com)



[www.sanjole.com](http://www.sanjole.com)  
[sales@sanjole.com](mailto:sales@sanjole.com)  
808-457-1452