BIG DATA INTERPRETATION AND CHALLENGES IN MOBILE NETWORK TESTING

Benjamin Teke and Zoltán Elzer
TESTING CHALLENGES
MOBILE TELEPHONY NETWORK

I WANT TO MAKE A CALL → ? → YOU HAVE A CALL

„What is in the network?“

- Network elements
  - Separate software instances

- Network
  - Connection of network elements
  - Communication according to standards
TESTING CHALLENGES

COMPLEXITY GROWTH

- 2G
- 3G
- 4G (LTE)
- Voice over 4G (VoLTE)
- Voice over WiFi

More complex network architecture = MORE TESTING

User Conference on Advanced Automated Testing
TESTING CHALLENGES
TEST LEVELS IN MOBILE NETWORK DEVELOPMENT

- Focus on end-to-end network
- Communication between network functions
- Check interworking and end-to-end behaviors
TESTING CHALLENGES

SOLUTION TEST

Mobile network

Load generators
Simulators
User equipment

Test automation tools
Business / Operational Support System

Test & operation framework
Traffic capturing and data collection

Signaling messages
BEYOND TESTING
AFTER TEST EXECUTION

• Automation of steps is required!

Focus
Automated analysis, troubleshoot and repair based on collected data
BEYOND TESTING
DATA COLLECTION

Network element reported
performance data
• MB to GB / day

Network element reported
session records
• MB to GB / day

Network element internal logs
• MB to GB / day

Traffic capturing
• Multiple TBs /day

SUM data size: „Small” VoLTE network = ~1-2 TByte/day
Example: 300+ application level messages per VoLTE call
BEYOND TESTING

DATA COLLECTION – TRAFFIC CAPTURING

• Monitoring
  • Various points of the network
  • Collect signaling messages

• The gathered data
  • Linear list of messages
  • Not certainly in the expected order

„How do we get the data?”
• **FIND** is the keyword

• **Incoming data**

• **No structure**

• **Flows can overlap**

• **Troubleshooting**

• **Time consuming**

• **Prone to errors**
Beyond Testing

Correlation – Structuring the Data

- Correlated data
- Assembled flows
- With grouping and filtering options
- Placed in the network
Beyond Testing
Correlation – Simplified Workflow

Forming the input

Intra-protocol correlation

Inter-protocol correlation

Connect flows to end-user
Beyond Testing

Correlation – Big Data Processing

- The tasks can be a separate services
  - Services can run parallel or pipelined parallel
  - Multiple instances can be started

- Real-time processing is achievable
  - Micro-batch processing
    - Same algorithm for offline and online processing

"Information must be correlated"
BEYOND TESTING
BIG DATA FRAMEWORKS – WHAT DO WE USE?

• Own platform
  • Helps to develop, test, maintain applications using Big Data technologies
  • Gathers open source frameworks

• Used frameworks
  • Processing: Hadoop MapReduce, Apache Storm, Apache Spark
  • Messaging: ZeroMQ, Apache Kafka
  • Misc.: Hadoop HDFS, Apache HBase, Apache Phoenix
EXAMPLE

VoLTE Call reference call-flow type

Sequence chart  Latency chart  Events  User identifiers

Protocols

- SIP
- Diameter

200 OK (LTE User)
INVITE AS (Orig)

100 Trying

ICS User
INVITE (ICS User)

100 Trying

488 Not Acceptable Here

488 Not Acceptable Here
TAKEAWAY

Focus on end-to-end system behavior and drill down to the details

Automation of data collection, analysis and troubleshooting

Multi-stage correlation to parallelly process diverse data

Common solution for offline and online analysis
QUESTIONS & ANSWER
Thank you for your attention.
COME AND SEE OUR DEMO