



Montimage is a French SME created in 2004. It provides a complete network monitoring and security management framework (**MMT**) for 4G/5G based on intelligent distributed monitoring agents and application for providing: fine-grained and configurable network visibility; security and performance monitoring based on Deep Packet/Flow Inspection and Machine Learning; automated management and control; and, customizable dashboards to define new collected statistics and configure new views or customize a large list of predefined ones.

Montimage is innovation leader in the **H2020 INSPIRE-5Gplus** project and participates in the **H2020 SANCUS** project dedicated to Beyond 5G network security. It also participates in **ANR-MOSAICO** project with Orange focusing on secure low-latency for 5G applications. It also participates in the French **5GOpenRoad** project to deploy its tools in the "plateau de Saclay" to showcase innovative services taking advantage of 5G in the fields of connected/autonomous vehicles, industry 4.0, and connected health.

Montimage is member of 5GPPP TMV and SME Working Groups, and of the French Systematic regional cluster's CoPil Digital Infrastructures & IoT. Montimage collaborates with several SMEs (e.g., Cumucore Oy in Finland), Industrials (e.g., Orange, Thales, Nokia in France, Telefonica in Spain) and Agencies (e.g., ENISA in Greece, Ministère des Armées in France).

With Cumucore it has developed a solution combining their 5G core and Montimage's security management framework (**MMT**) to obtain a highly secure elastic and automated 5G core network box (described in page 3 and 4).

It has also developed an open-source solution, **5GReplay** (www.5Greplay.org, launched in October 2021), that allows replaying 5G network traffic and performing scalability, performance and robustness tests of the different 5G network elements (described in the next page).

Contact information

Partnership plan: *Integration of Network Core and Monitoring solutions within your system*
 Set-up of Proof of Concepts
 Deployment and operation of Network Core and Monitoring solutions

Send an email to: contact@montimage.com

Acknowledgements

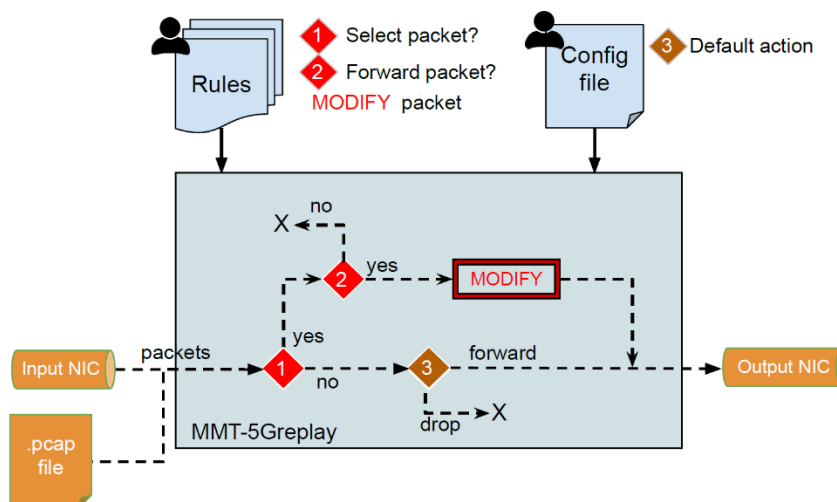
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5G Replay

To overcome the lack of solutions (TCPReplay and Scapy are not 5G-oriented) to formally create or modify existing 5G network protocol packets and inject them into a network, making it easy to test the network functions.

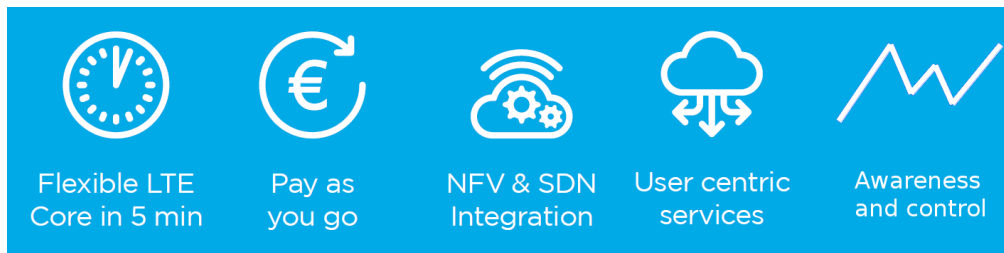
5Greplay

An open-source solution to perform fuzz testing of 5G networks. 5Greplay aims to facilitate the testing process of 5G virtual network functions and IDSs by allowing to forward network packets from one network interface card (NIC) to another with or without modifications.



5Greplay's main architecture: Incoming network packets are filtered according to predefined defined rules that determine which packets are to be modified, forwarded or dropped before being sent to the output NIC.

Elastic & Automated Core Network box



Network core:

- Flexible, agile, scalable 4G and 5G-ready core;
- Reduce high upfront investments in the core;
- Pay as you grow based on actual used capacity;
- Reduce OPEX due to better automation and more optimized network;
- Integrated with software-defined networking and network function virtualization;
- Improve operator ARPU by enabling personalized services to their customers;
- Fast deployment in 5 minutes;
- IoT ready network infrastructure (slicing, efficiency);
- Reliable and robust core for emergency and safety networks;
- Future proof with extensions to become 5G core.



Integration with optimized services; caching, content delivery, IPTV and OTT services:

- Traffic savings in packet core of up to 40%;
- End-to-end latency reduced by 60%.

Network monitoring:

- Intelligent distributed monitoring agents;
- Fine-grained and configurable network visibility;
- Security and performance monitoring based on DPI and machine learning;
- Automated management and control;
- Customizable dashboards to define new collected statistics and configure new views or customize a large list of predefined ones;
- Dynamically updated topology; information, statistics, configuration of e/gNodeBs, MMEs and UEs.



Selection of dashboards:

- 1) Dynamically updated **topology** and **configuration** of network elements:

The screenshot displays the eNodeB dashboard interface. The main view is a network topology diagram showing connections between eNodeBs and UEs. A 'Detail of UE' window is open, showing configuration fields for a specific UE:

- IMSI: 0033654321012
- MME Code: 1
- MMT Group Identifier: 2
- cltT: [empty]
- MBMS: [empty]
- IP: 10.200.1.254
- Default Bearer ID: [empty]
- Dedicated Bearer ID: [empty]
- eNodeB Name: enb_node1
- Attach:
- Active:

- 2) Detailed **information** and **statistics** of eNodeBs, MMEs and UEs:

The screenshot displays the eNodeB dashboard interface showing detailed statistics for User Plane, Control Plane (eNodeB and MME), and a traffic graph for a specific UE.

User Plane Statistics:

IP of UE	Data Volume (B)	Packet Count	TEID Count
10.200.1.254	277252	518	3

Control Plane: eNodeB Statistics:

IP of eNodeB	MAC of eNodeB	Data Volume (B)	Packet Count
172.16.0.2	00:0f:bb:ef:81:06	7012	66

Control Plane: MME Statistics:

IP of MME	MAC of MME	Data Volume (B)	Packet Count
10.200.1.254	00:0f:bb:ef:81:06	7012	66

Detail of UE: 10.200.1.254

Timestamp	eNodeB	GW	Destination	TEIDs	Data Volume (B)	Packets Count
2017-05-24 13:20:00	172.16.0.2	172.16.0.1	173.194.73.188	2089, 24561856	7278	21
2017-05-24 13:20:00	172.16.0.2	172.16.0.1	8.8.8.8	0, 24561856	335	3
2017-05-24 13:20:00	172.16.0.2	172.16.0.1	8.8.8.8	2089, 24561856	3884	25

Traffic of IP: 10.200.1.254 (in period from 13:15:40 to 13:20:40)

The graph shows Data Volume (B) on the Y-axis (0 to 154.57K) and Time on the X-axis (13:15:40 to 13:20:40). The legend indicates In (203.98KB) and Out (73.28KB).