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# IST SAILOR Project

## Sailor Demonstrator

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Four companies of the SAILOR team involved in the SAILOR Demonstrator Implementation.





# The Concept (1)

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- Ø The SAILOR demonstrator shall be able to demonstrate the feasibility/advantages/drawbacks of a unified SIP based NAS (Non Access Stratum) protocol for the provision of real time services in the PS domain.
- Ø A SIP based concept for NAS signalling in combination with an all-IP core network architecture.
- Ø Novel concept for NAS signalling which replaces the currently standardised GPRS mobility and session management by SIP signalling.
- Ø Extended or additional fields used in the SIP messages to fulfil the functionalities covered by current NAS protocols (determination of current location of a terminal within the access network, management of the assignment of bearers).



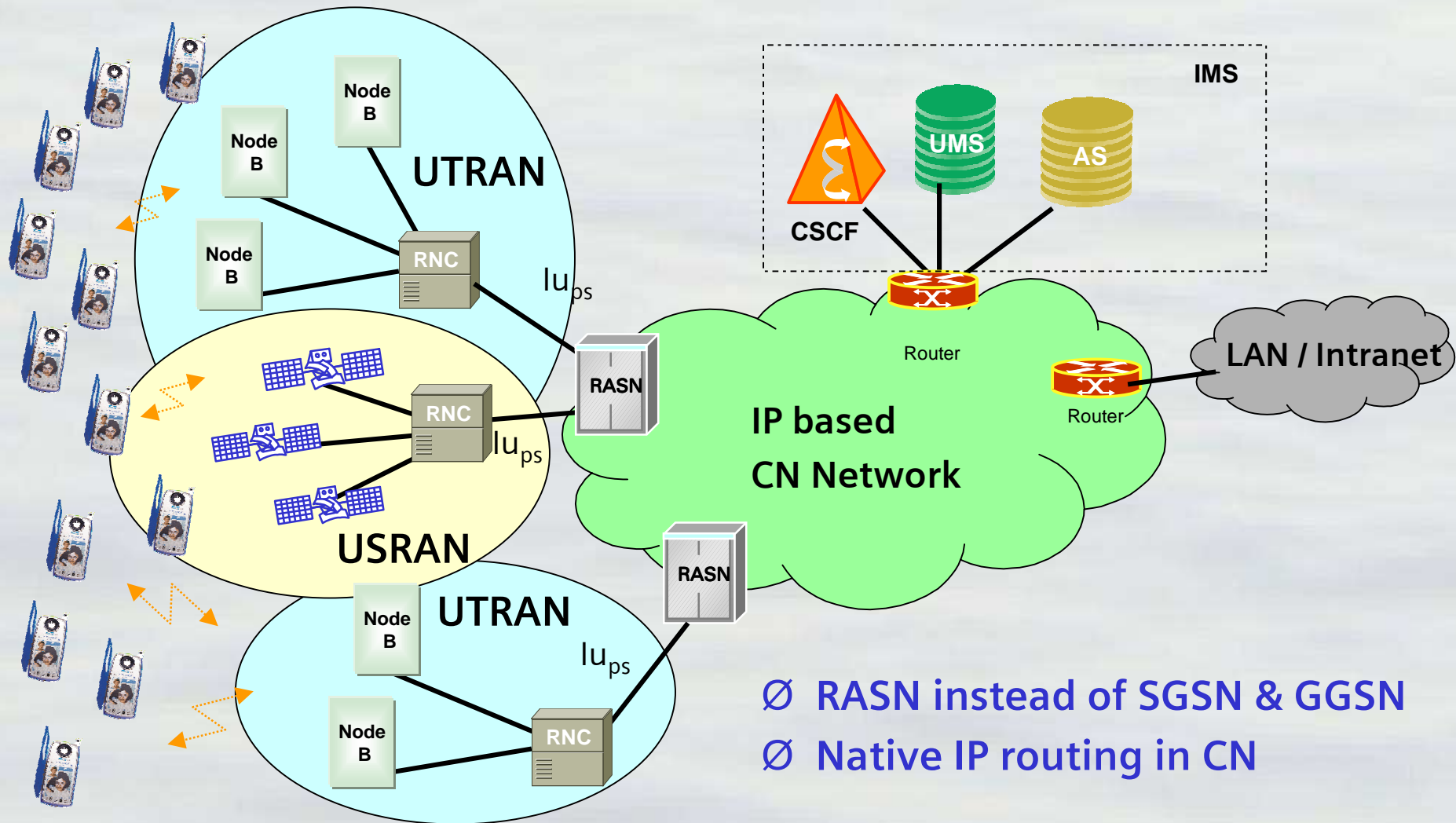
# The Concept (2)

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- ∅ Fields denoted as SIPRAN, indicating that they contain information being only relevant in within the radio access network.
- ∅ The concept aims at the avoidance of repetitive transmission of information serving the same purpose (User Identity, QoS parameters etc.) in order to save capacity on the used channels.
- ∅ SIPRAN protocol to be run between the mobile terminal and a network node (RASN, Radio Access Support Node) located between Access Network and Core Network in order to on the one hand covering the currently standardised features of session and mobility management while reducing the expected signalling traffic on the other.
- ∅ RASN is a very innovative concept allowing to apply a new concept of Core Network without the classical SGSN and GGSN and using the IP Network as UMTS Switching network.

# SAILOR Target Architecture





# Demonstrator Architecture (1)

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∅ SAILOR demonstrator is composed of four different stratum:

§ IMS, the multimedia service provision platform

§ RASN set, handling SAILOR mobility and session management and inter-connecting properly IMS with user mobile terminals.

§ Access Network Emulator (ANE), implementing legacy T-S-UMTS radio protocols.

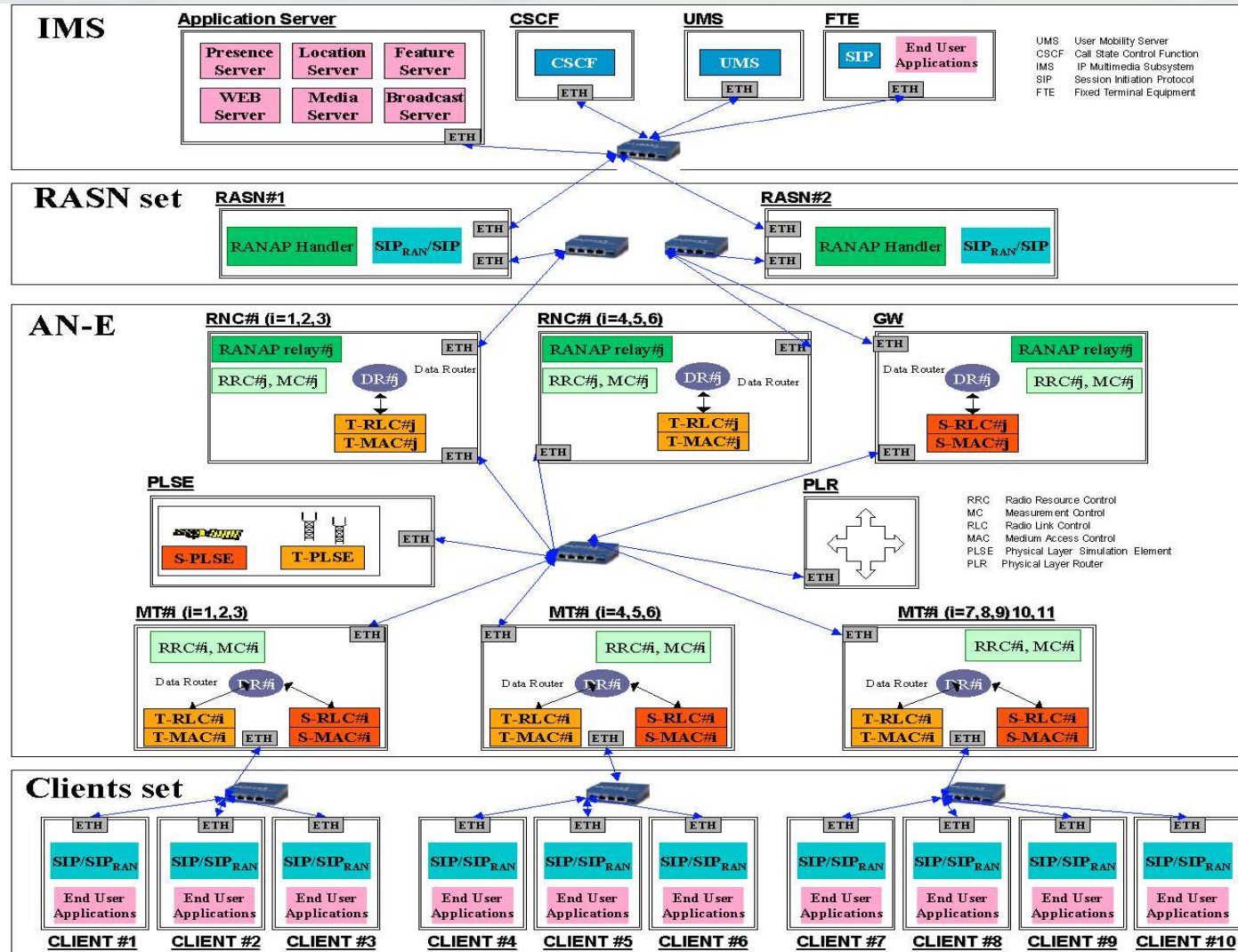
§ User terminals, either mobile or fixed.

∅ All of the stratum must interoperate among them in real time, emulating on a small-scale the functioning of a real network.

∅ All of the hardware used is COTS and the software development tools open.

∅ Non standard IP routing is needed, implemented through low level capturing/sending OS libraries.

# Demonstrator Architecture (2)





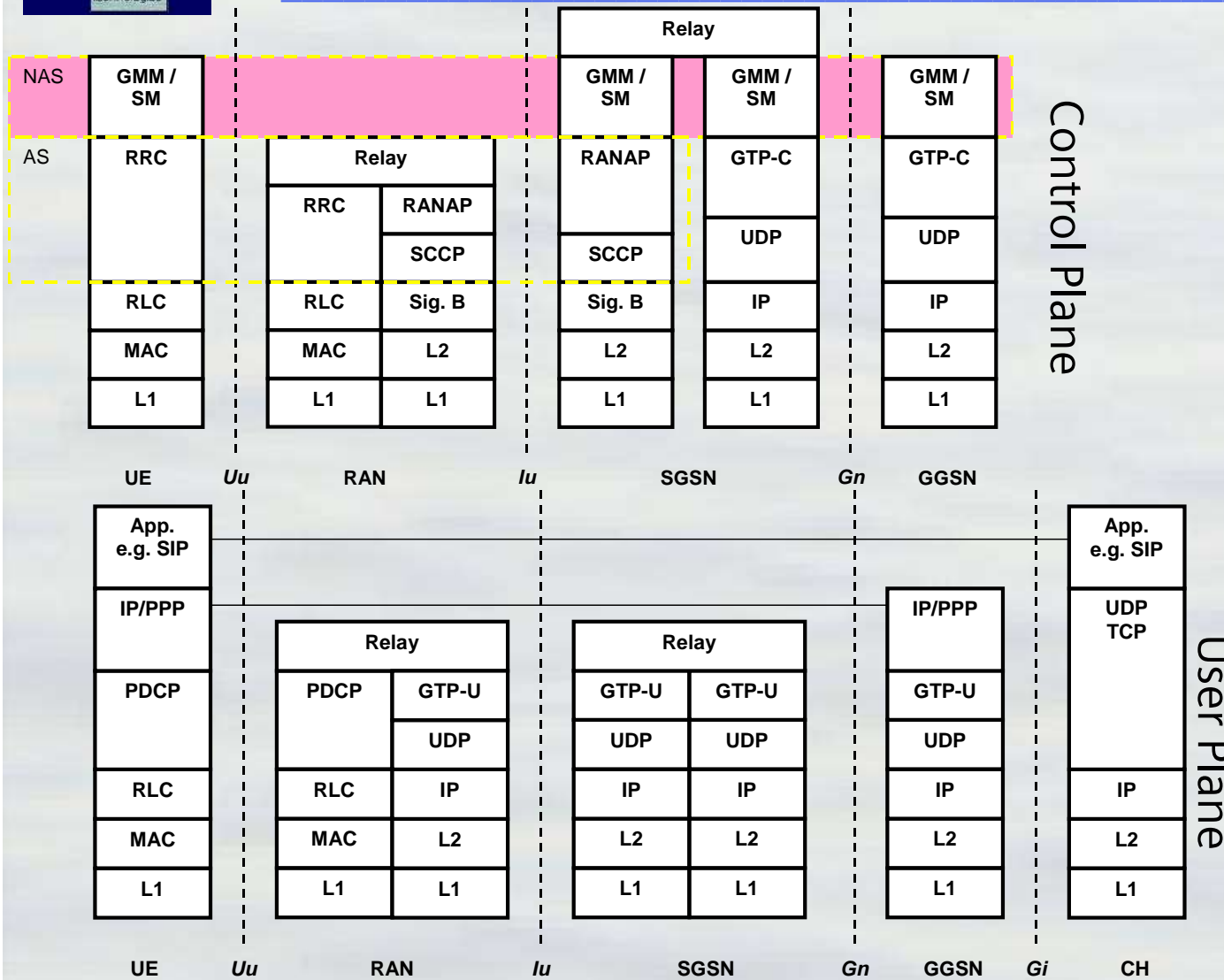
# Required Mobility Features

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- ∅ Personal Mobility: The user shall be able to communicate irrespective of the terminal used.
  
- ∅ Discrete Terminal Mobility: The terminal shall be operable irrespective of its current location.
  
- ∅ Continuous Terminal Mobility: The Terminal may move, without losing the connection.

# Legacy 3GPP: Protocol Stacks



Provides:

∅ Personal Mobility

∅ Terminal Mobility

§ Discrete

§ Continuous

∅ IP Infrastructure not aware of mobility (GGSN as Anchor)



# Evaluated Approaches

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## ∅ SIP over NAS:

- § SIP via user plane, NAS via control plane.
- § Except for inter RASN relocation (re-INVITE) no modification of legacy 3GPP system.

## ∅ SIP beside NAS:

- § Translate NAS to SIP in RASN terminate NAS for SM/MM in RASN, Use SIP for NAS signalling in IP Core Network.

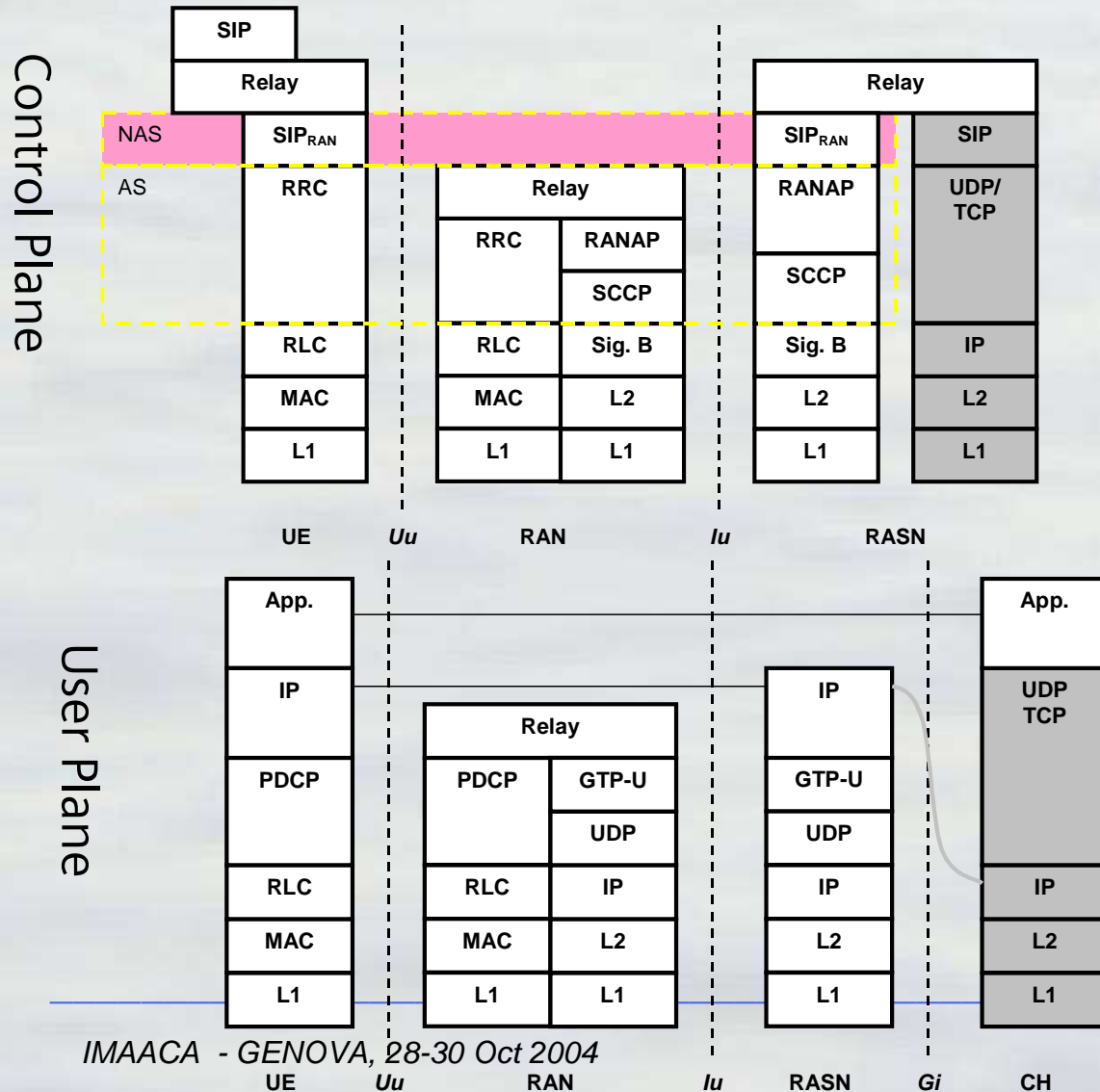
## ∅ SIP over MIP:

- § Terminals are MIP enabled, FMIP for inter RASN relocation

## ∅ SIP only:

- § Send enhanced SIP messages via UMTS control plane for all signalling above AS.

# Chosen Approach: SIP Only



∅ Enhanced SIP messages are transported via UMTS control plane

∅ Towards IP CN, conventional IETF SIP is used

∅ Significant Reduction of Signalling Effort expected

∅ Provisioning of personal and terminal mobility

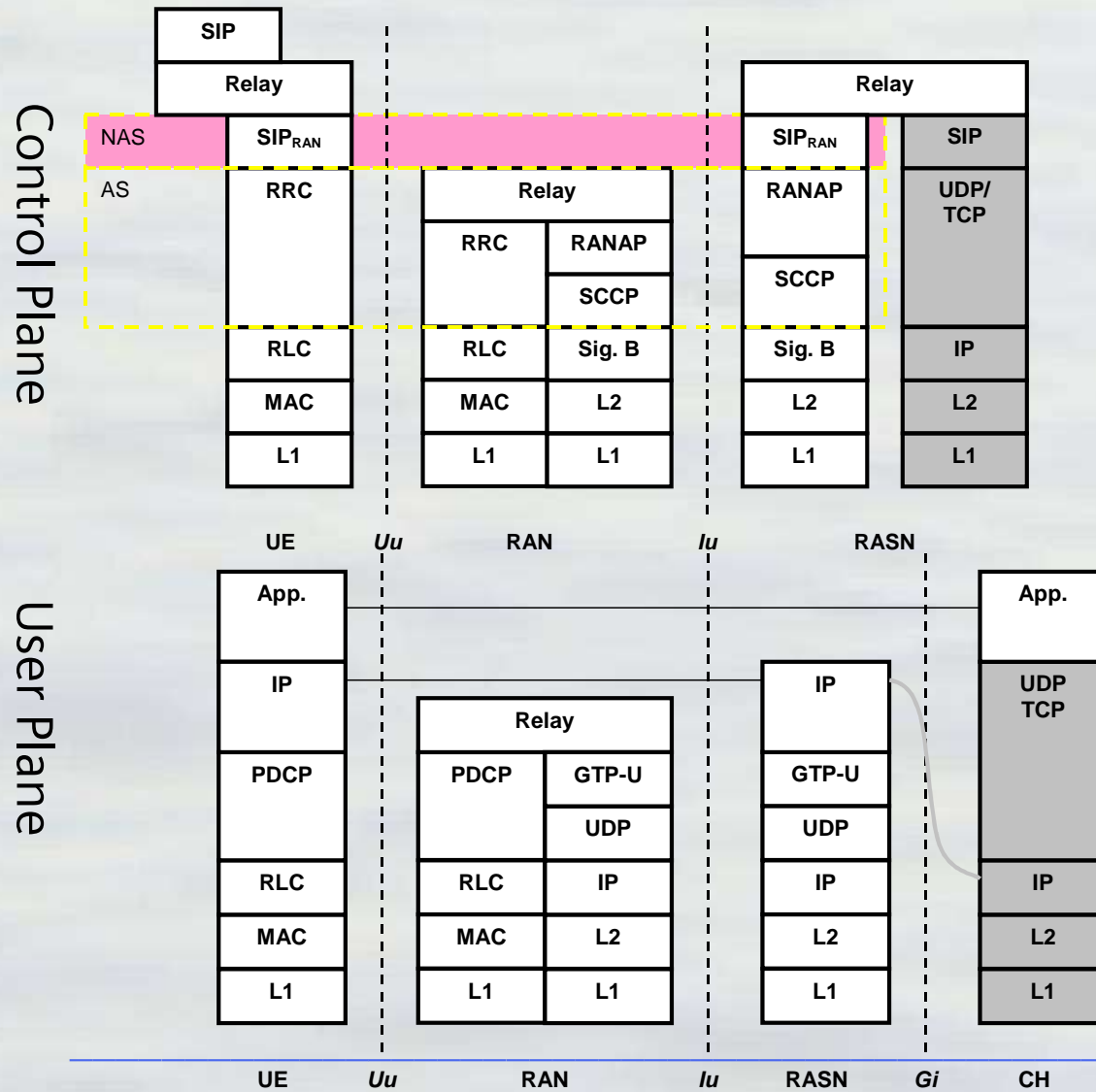


# Mapping of Procedures SIP/3GPP NAS



<i>3GPP NAS Procedure</i>	<i>SIP Method</i>
<b>MM</b>	
Attach / Detatch	REGISTER
Auth. & Ciphering Request	SUBSCRIBE / NOTIFY
RA-Update	REGISTER
<b>SM</b>	
PDP Conetxt Activation	INVITE
PDP Context Modification	(re)-INVITE
SGSN relocation	(re)-INVITE / CORE
PDP Context Deactivation	BYE

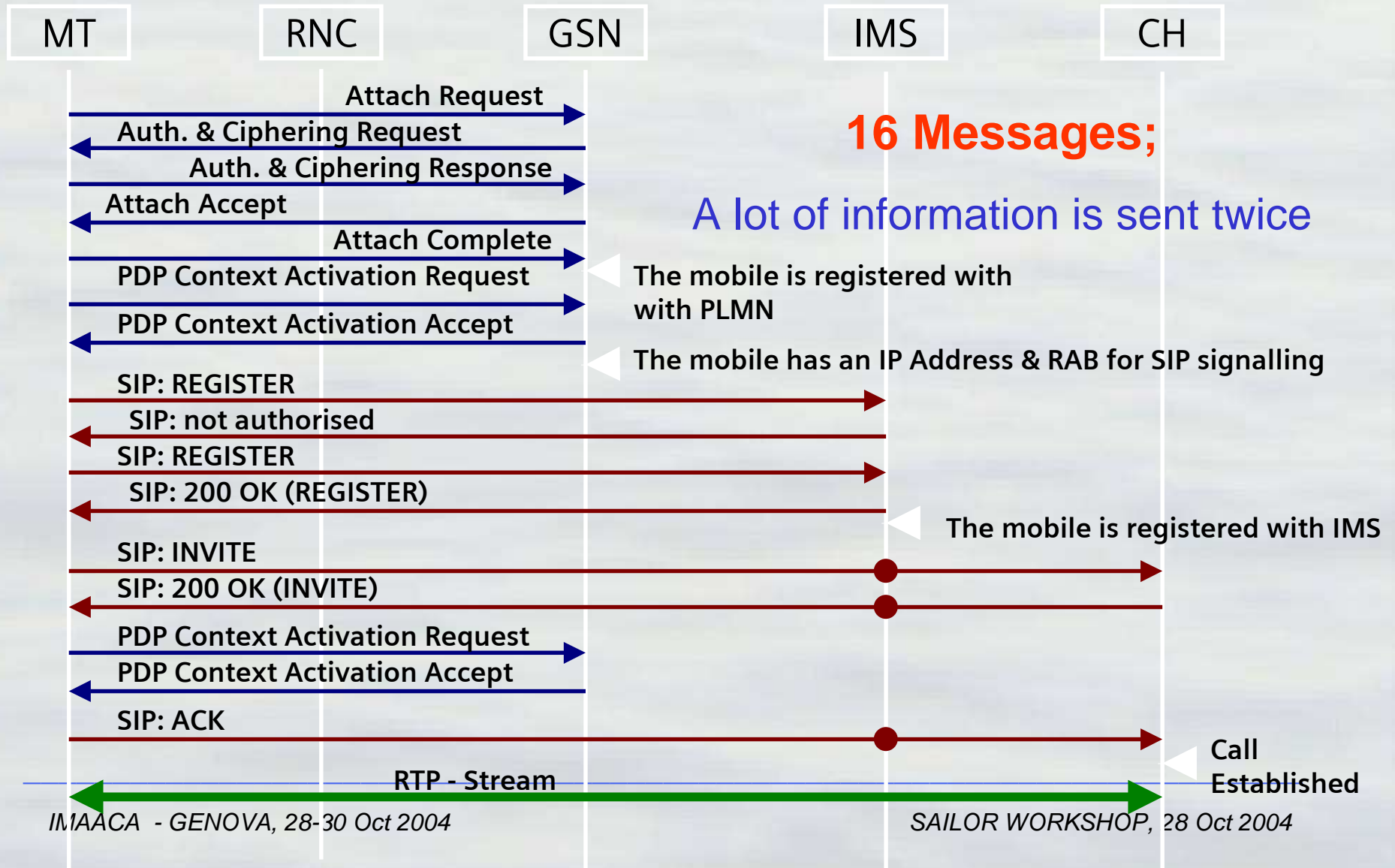
# New Approach: SIP replaces NAS



- ∅ Optimised Method for Session & Mobility Handling
- ∅ Conventional 3GPP-SIP used towards IP CN
- ∅ Enhanced SIP messages are transported via UMTS control plane
- ∅ Significant Reduction of Signalling Effort expected, by single registration and combined bearer and application session

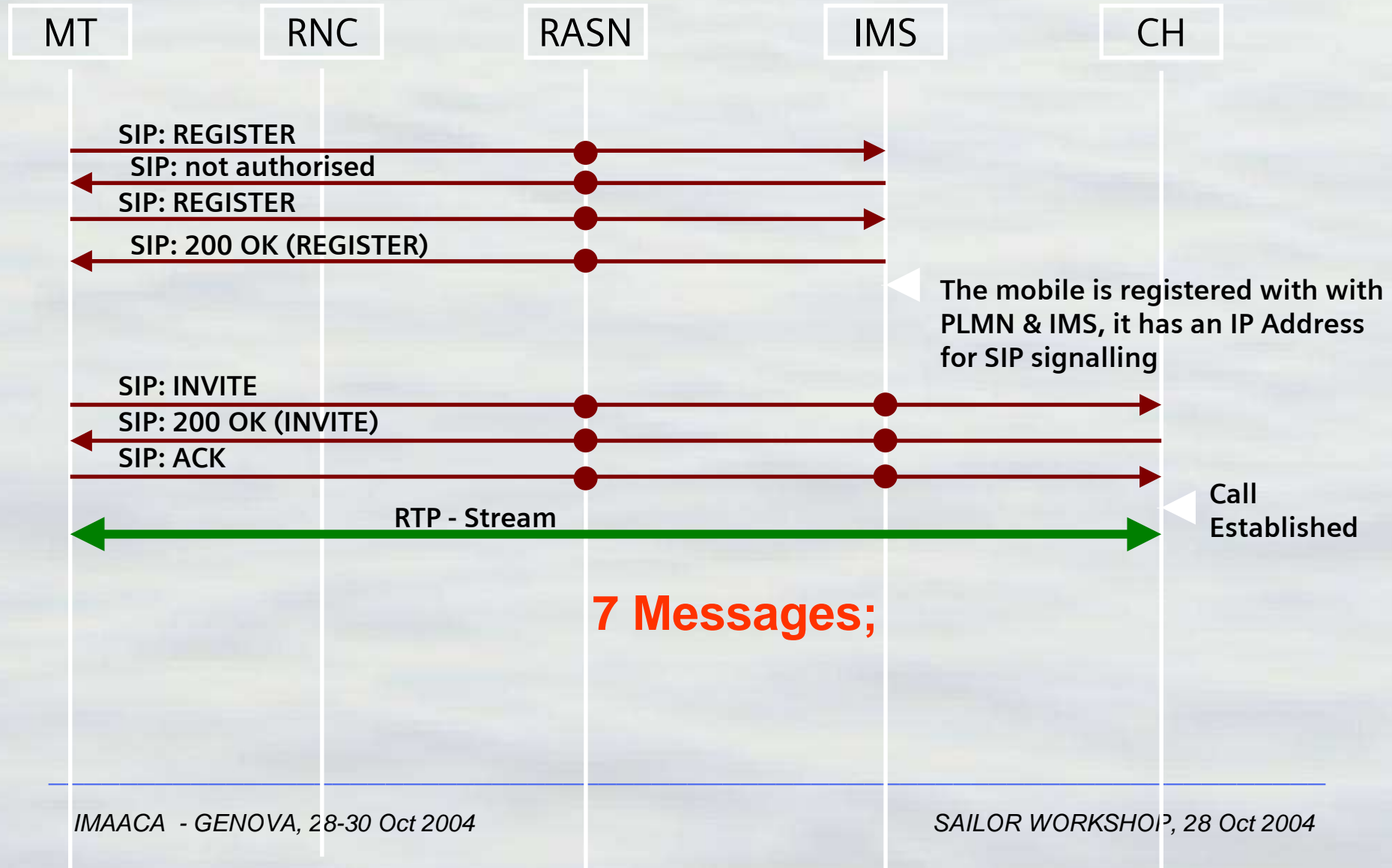


# SIP over NAS Registration & Session Initiation



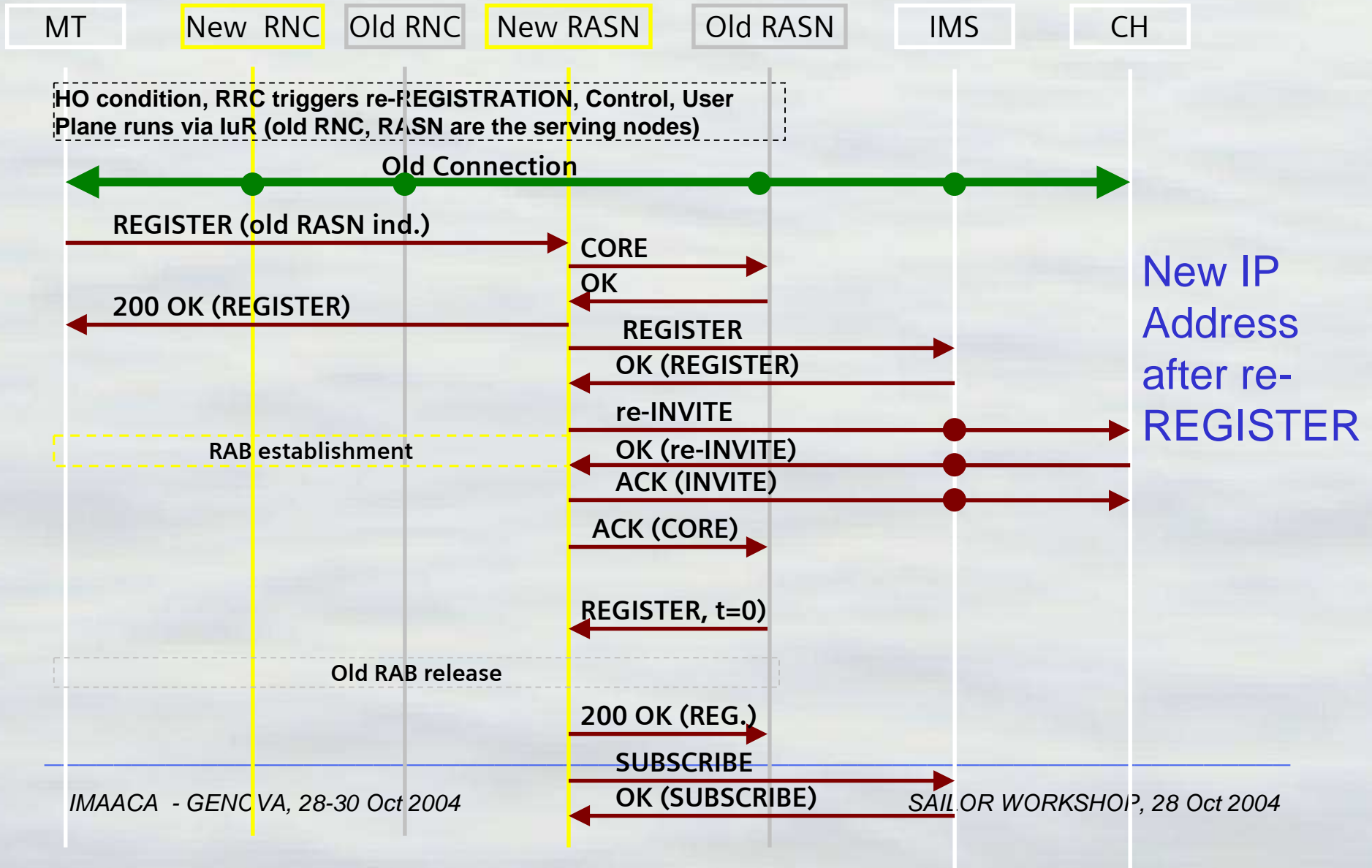


# SIP only: Registration & Session Initiation

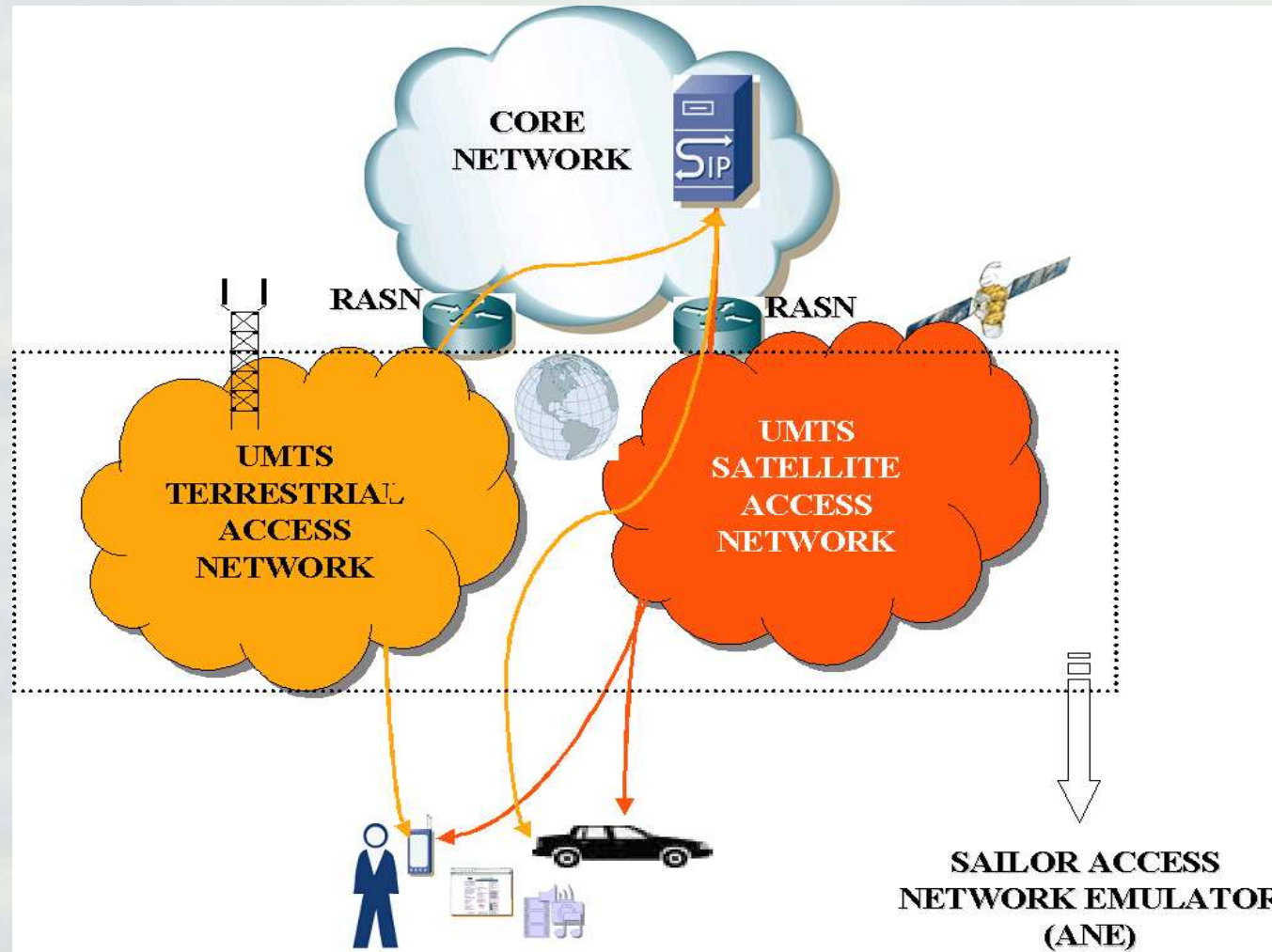




# SIP only: Continuous Terminal Mobility



# SAILOR Access Network Emulator (1)





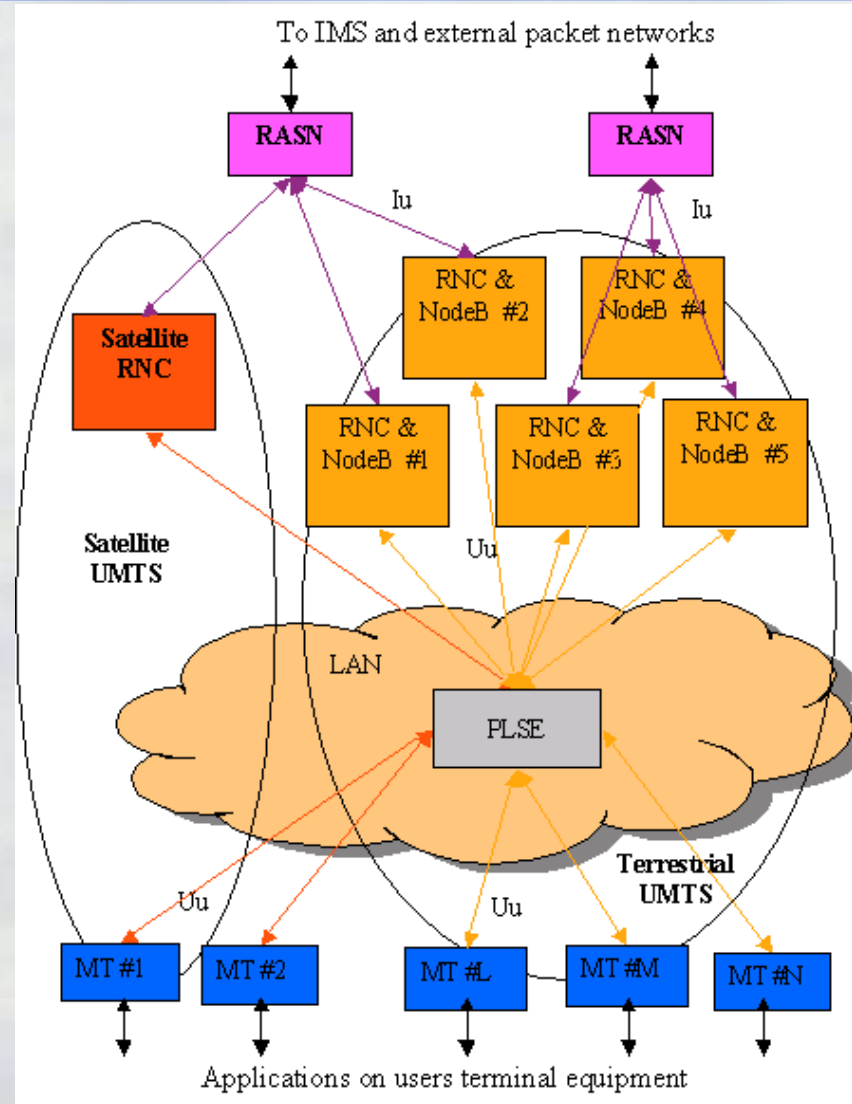
## SAILOR Access Network Emulator (2)

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- Ø SAILOR ANE is designed to support the RASN node concept, offering a realistic radio environment to test mobility and session protocols, as well as end user traffic handling.
- Ø ANE emulates two Terrestrial Access Networks, one Satellite Access Network and a limited number of Mobile Terminals for which Multicast and Unicast connections are supported.
- Ø ANE basically consists of a Physical Layer Simulator Element (PLSE) and a set of nodes implementing Radio Upper Layers Functionalities both at Mobile Terminals and Network sides.

# SAILOR Access Network Emulator (3)





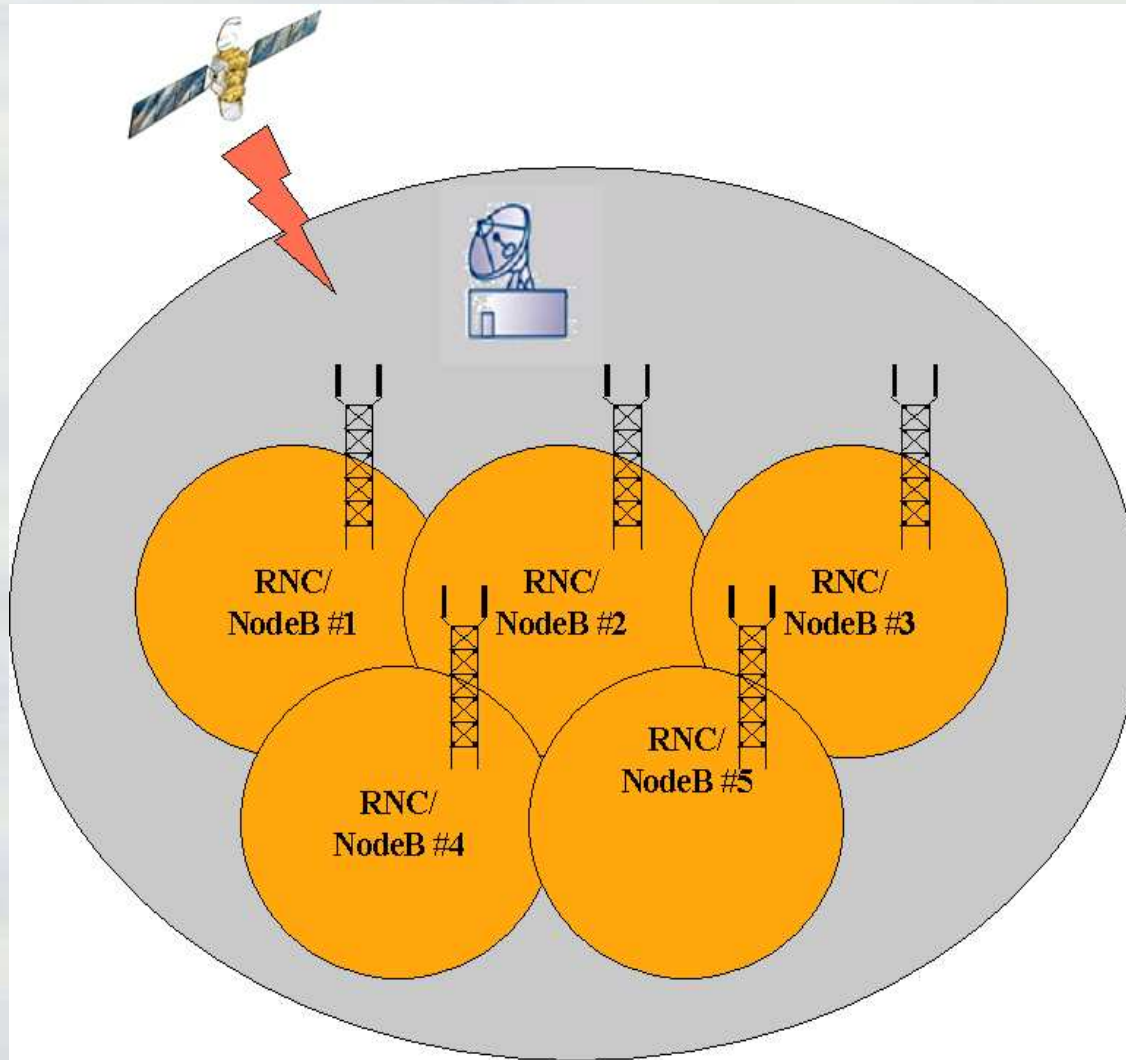
# Physical Layer Simulation Element (1)

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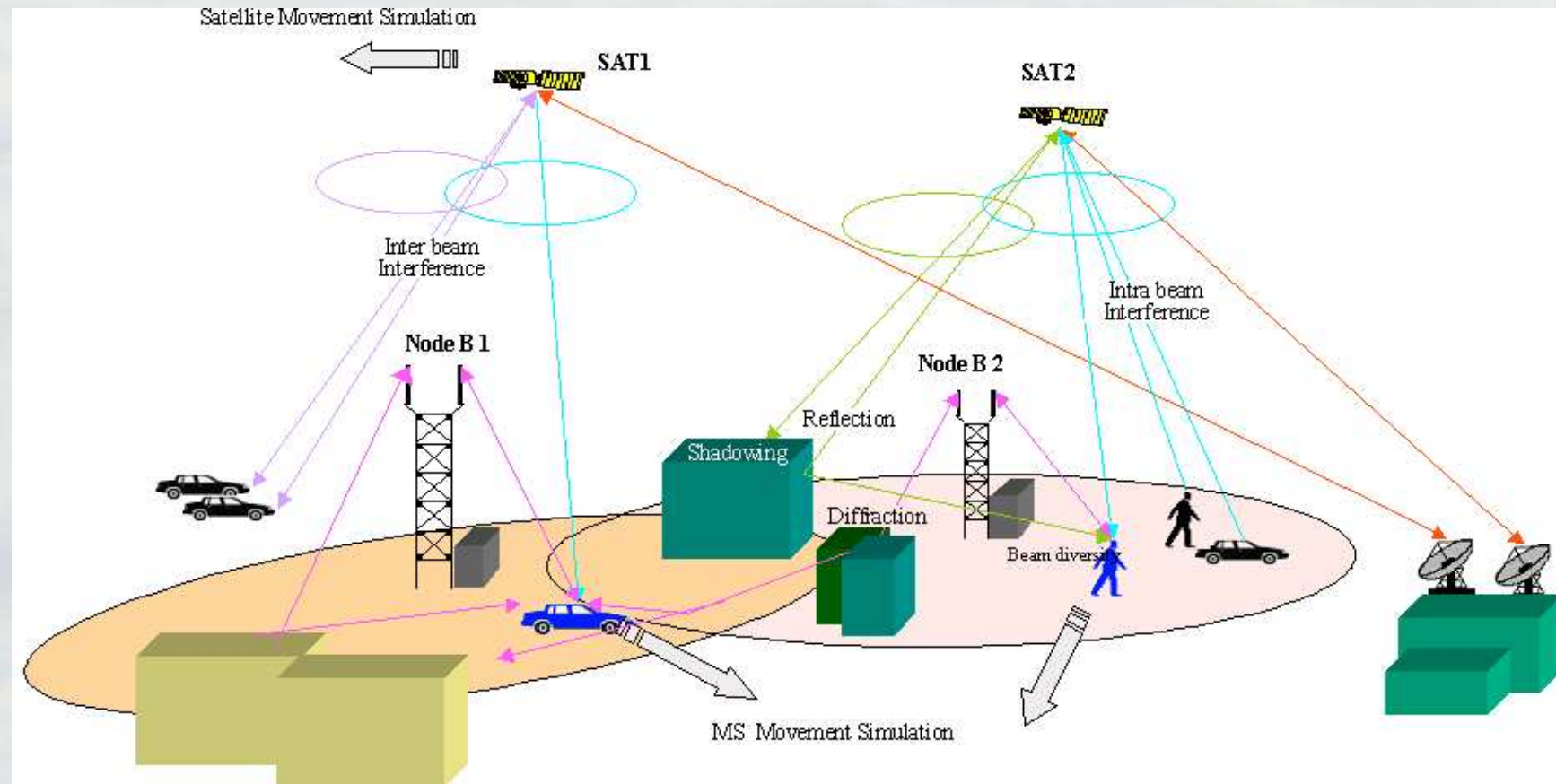


- Ø The Physical Layer Simulation Element (PLSE) implements terminal mobility and radio channels:
  - § It contains the coverage map over which terminals are moving and generates events upon cell crossing
  - § It emulates the physical layer of the various active connections introducing propagation errors & delays basing on instantaneous simulated channel conditions (fading & path attenuations, interference, etc).
- Ø The considered coverage area includes a large UMTS satellite cell plus five UMTS terrestrial cells, being both segments overlapped.
- Ø Unlike the terrestrial segment, the satellite segment is always available.
- Ø The satellite segment is particularly suited for multicast/broadcast applications, and as a backup in case of loosing terrestrial coverage.

# Physical Layer Simulation Element (2)



# Target Concept





# Radio Upper Layers in ANE

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- ∅ Radio Upper Layer Nodes implement RRC, MAC, and RLC radio layers, and the interface to the NAS plane.
  - § Network side nodes are Radio Network Controllers (RNC).
  - § User side nodes are Mobile Terminals (MT)Radio Network Controllers (RNC).
- ∅ RRC layer supports mobility management (seamless handover with Iur interface) and radio bearer management (set-up/release of unicast and multicast logical channels).
- ∅ The MAC and RLC layers of each RNC provides 10 unicast bidirectional channels per MT connected plus 3 multicast unidirectional channels to be shared among the served terminals.
- ∅ The MAC and RLC layers of each MT provides access to the unicast and multicast channels offered by both satellite and terrestrial RNCs.



# SAILOR Trials

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∅ Enhanced SIP Trials shall focus on:

- § Functional Verification of SIPRAN.
- § Quatitative Comparison of Performance of Signalling Procedures (rel. to FUTURE, VIRTUOUS).
- § Identification of open Issues in SIP based terminal mobility.



# Contact Details

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# Thank You !!!