Inmarsat BGAN

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What is BGAN?

- **Worldwide L-band 3G service**
- **Launched 2005**

- **Data**
- **Voice**
- **SCADA**

- **US DoD**
- **News agencies**
- **Oil & gas**
- **Maritime**
- **Charity/humanitarian organizations**

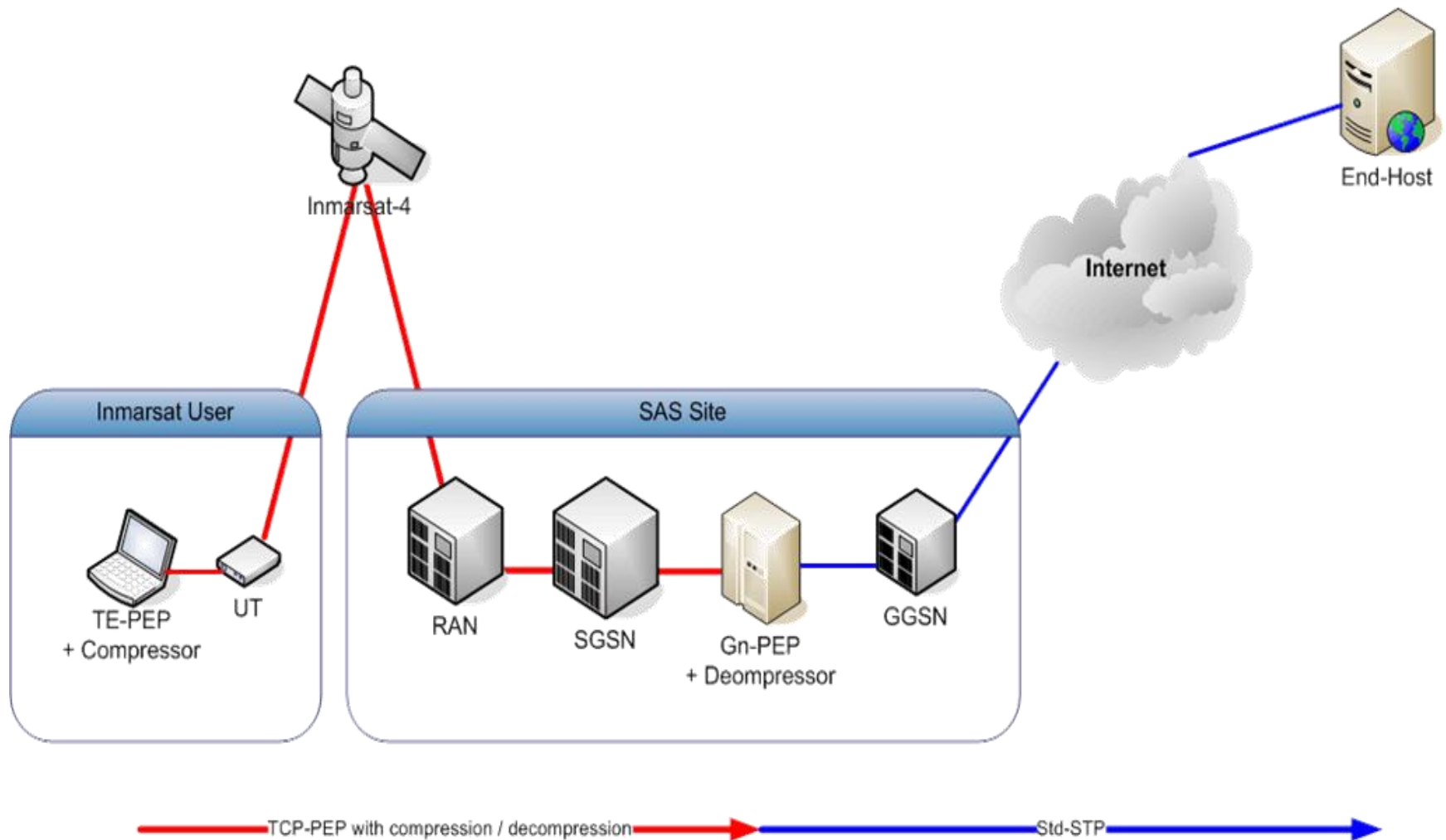I-4 Americas   I-4 EMEA   I-4 Asia-Pacific

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Challenges

Latency

> Average RTTs of 1100ms (normal mode) and 800ms (streaming mode)

> Legacy systems used by customers

>> Default receive window sizes too small

>> No SACK support

>> TCP Tahoe/Reno not effective in laggy & lossy environments

>>> Slow start: congestion window increases by the number of acknowledged bytes. Performs poorly with short lived connections

>>> Packet loss -> congestion window resets, entering the congestion avoidance phase (linear growth)
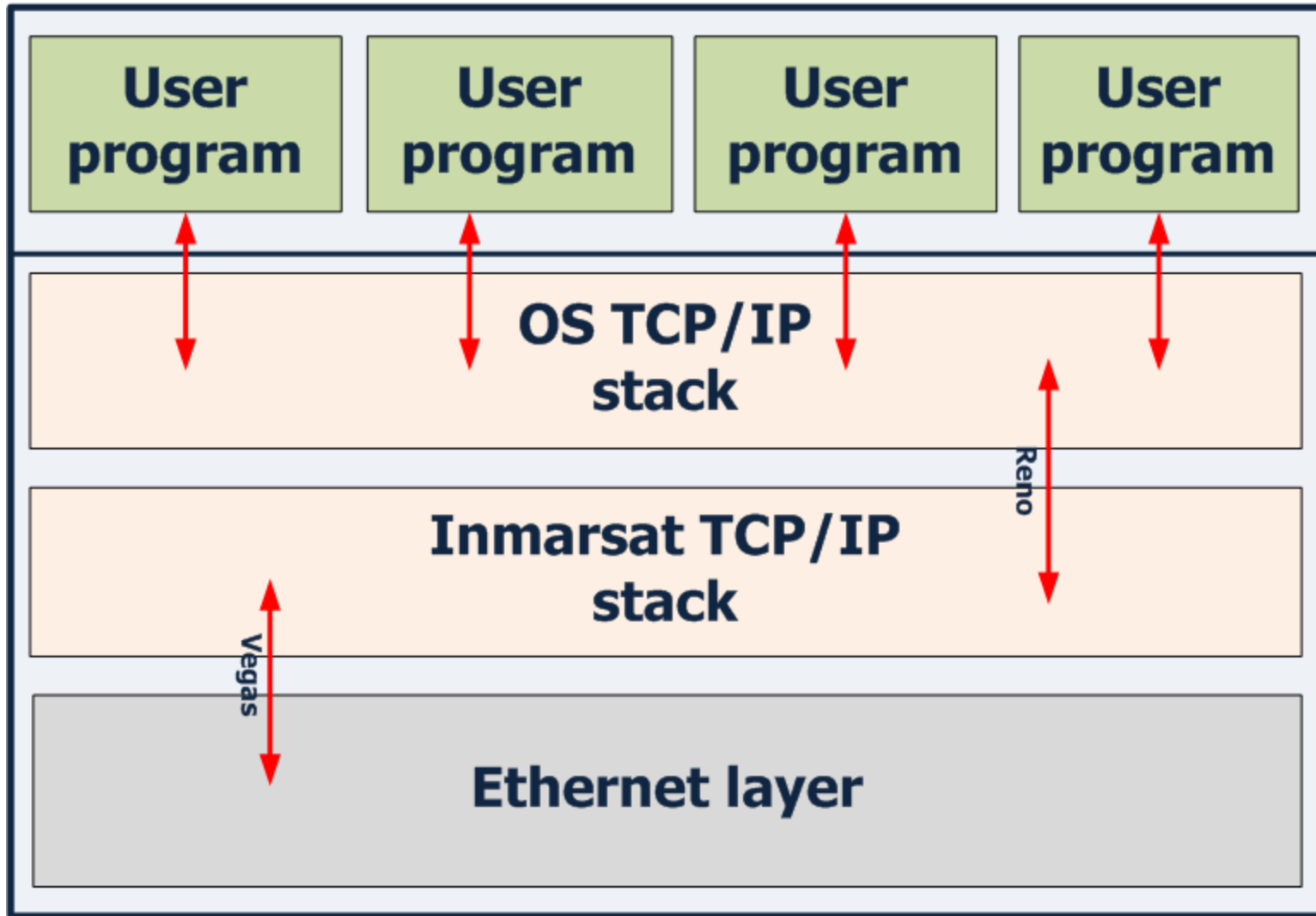
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Solutions

Inmarsat TCP-PEP

> **Inline transparent TCP enhancing proxy providing L3 acceleration**

>> **Fast start**

>> **Large receive window sizes (128KB)**

>> **SACK**

>> **TCP timestamps**

>> **TCP Vegas (delay-based congestion control)**

>> **LZ77 payload compression**

>> **End to end capability negotiation using TCP options**

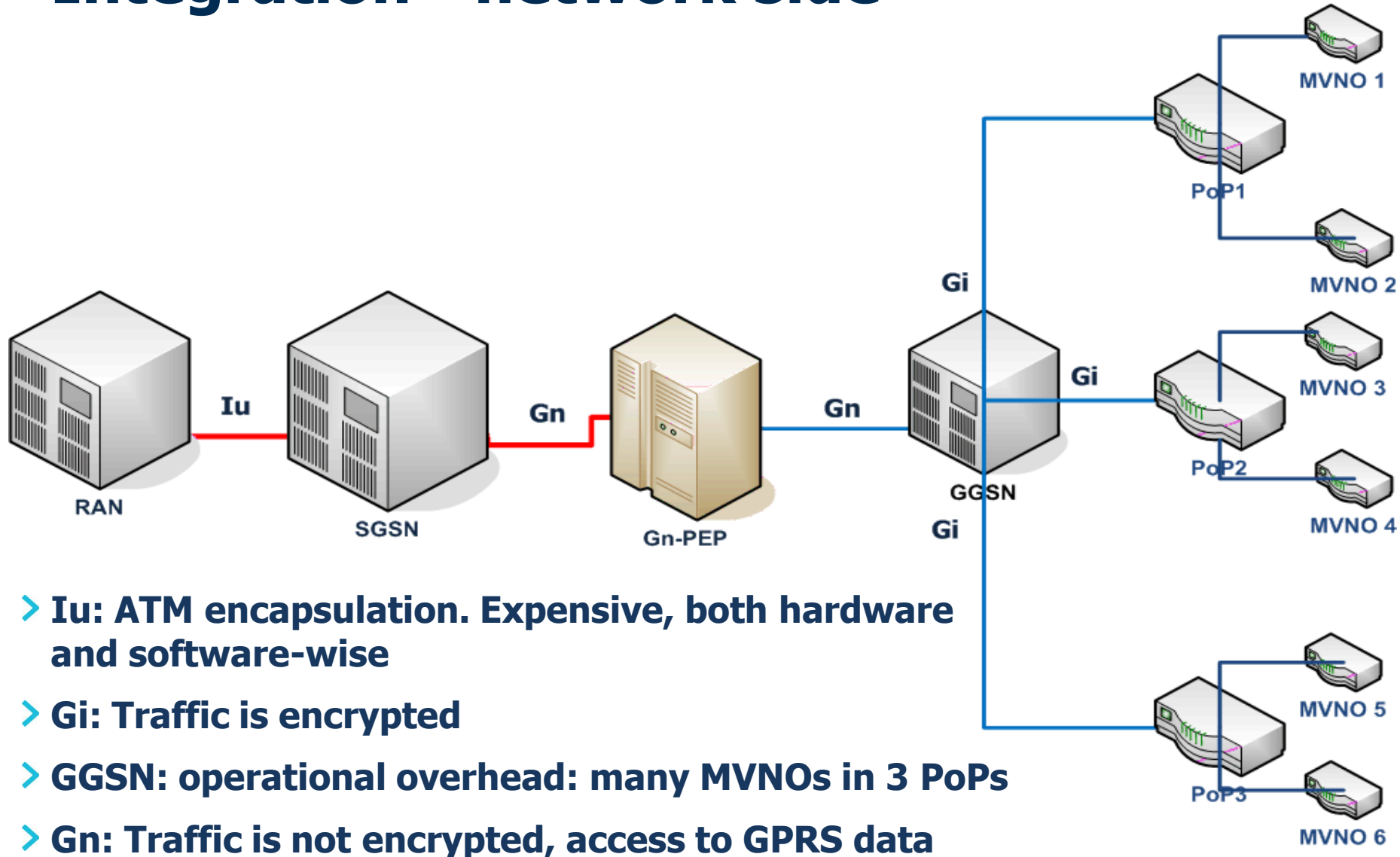> **MVNOs to provide L7 acceleration as a product differentiator**

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Integration – end to end

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Integration - client side

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Integration - network side

> **Iu: ATM encapsulation. Expensive, both hardware and software-wise**

> **Gi: Traffic is encrypted**

> **GGSN: operational overhead: many MVNOs in 3 PoPs**

> **Gn: Traffic is not encrypted, access to GPRS data**

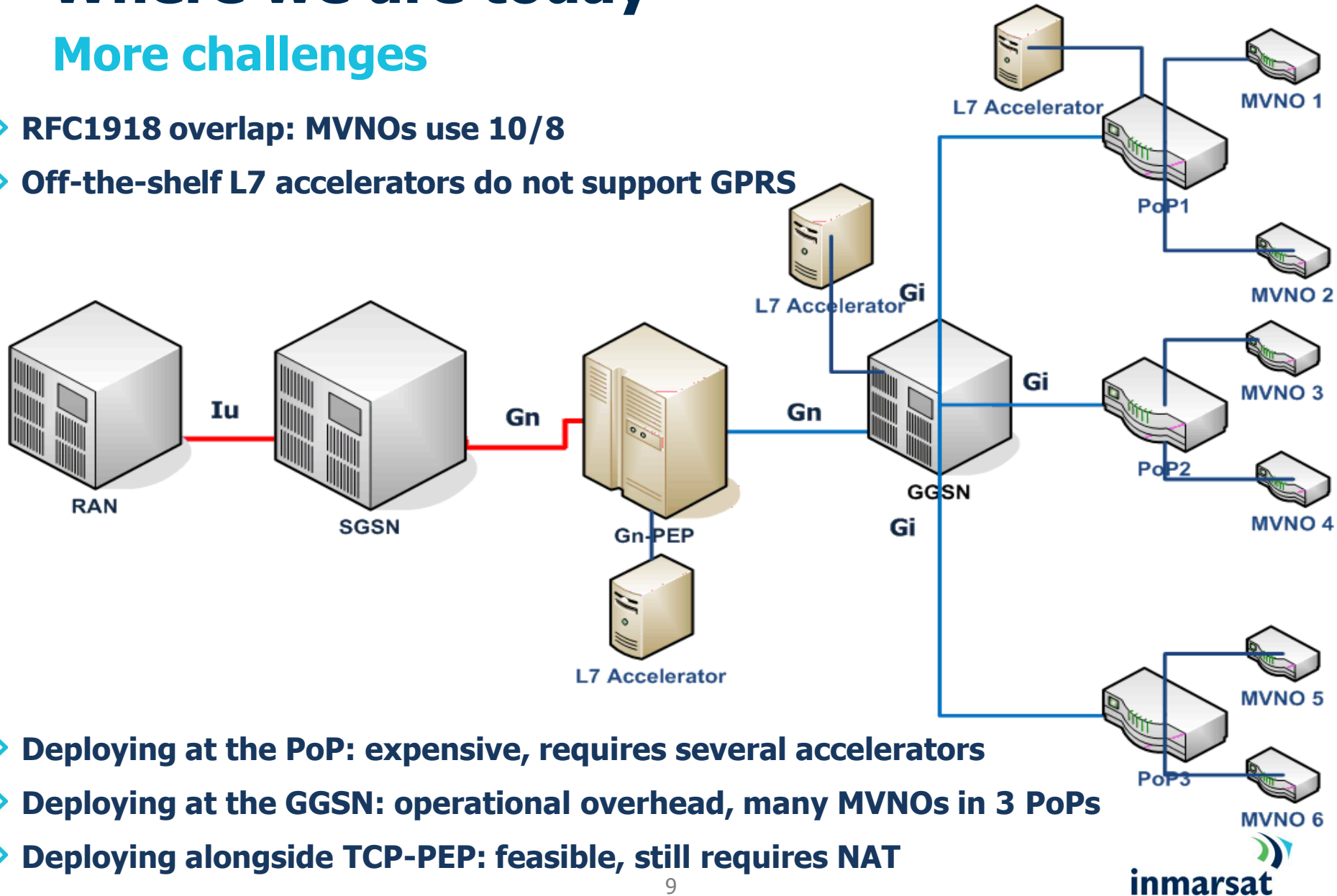inmarsat

Where we are today
Shifting focus

> **Better default TCP/IP stacks (CTCP, Westwood+, CUBIC)**
>> **Customers (slowly) upgrading to new OS versions**
>> **Internet servers have large initial congestion windows**

> **Web content much richer than in 2005**

> **L7 acceleration not widely deployed by MVNOs**

> **Inmarsat becoming a fully-fledged ISP, looking at deploying L7 accelerators**

> **JS/CSS amounting to ~½ of an average page load time**

> **HTTP request coalescing, lossy JPEG compression, text trimming**

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Where we are today

More challenges

> RFC1918 overlap: MVNOs use 10/8

> Off-the-shelf L7 accelerators do not support GPRS

> Deploying at the PoP: expensive, requires several accelerators

> Deploying at the GGSN: operational overhead, many MVNOs in 3 PoPs

> Deploying alongside TCP-PEP: feasible, still requires NAT

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Where we go tomorrow
2013: Inmarsat Global Xpress

> **K$_a$-band broadband network:**
>> **End-user service support**
>> **Up to 50Mbps downstream/up to 5Mbps upstream**
>> **Lower latency**
>> **Larger terminals – 0.6m to 2.4m aperture**
>> **Built-in L3 acceleration based on real-time hints from the OTA interface**
>> **IPv6**
> **BGAN/GX coexistence**
>> **Shared MVNO interconnections**
>> **L7 acceleration platforms could be used by both BGAN & GX**

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Thank you!