Mobile broadband -Dual Stack IP connectivity

Proof of concept using 3GPP standard BASED Products in live networks

...this is definetly not rocket science :-)

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Outline

- Real world deployment – Why and when?
- Live network Proof of Concept Setup
- New opportunities
- Conclusions
- ... and live network demonstration

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Real world DEployment
Why and when?

- FEAR - Main reason for global interest is due to IPv4 address pool being almost in full use in terms of allocations – Running out of IP addresses

Running out of rails

Exploring new frontiers

- OPPORTUNITIES - Advantages of using IPv6 such as restoring Internet end to end capability is finally being explored – Gaining new business

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WE ARE THE BORG
ALL YOUR IPv4 HARDWARE
AND SOFTWARE WILL BE
ASSIMILATED AND MADE
IPv6 CAPABLE
RESISTANCE IS FUTILE

...Now BAck to reality

- When? What about..... NOW! (finally)
  - Operators are now gaining momentum. Several operators have calculated when they will run short on IPv4 addresses. Global IPv6 pool is monitored by the Interent community http://www.potaroo.net/tools/ipv4/index.html
  - Software is appearing that makes use of some of the benefits that IPv6 brings us.
  - First of the Internet Megastars ( ) starts operating dual stack IP services
  - ”Internet of Things” has adopted IP as the enabler of communication
  - 3GPP Standards has defined an IPv6 capable user plane since Release 97 so the products are out there
  - Release 8 (EPS) and Release 9 (GPRS) defines dual stack over a single mobility tunnel to because one is cheaper than two

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Live network Proof of Concept Setup

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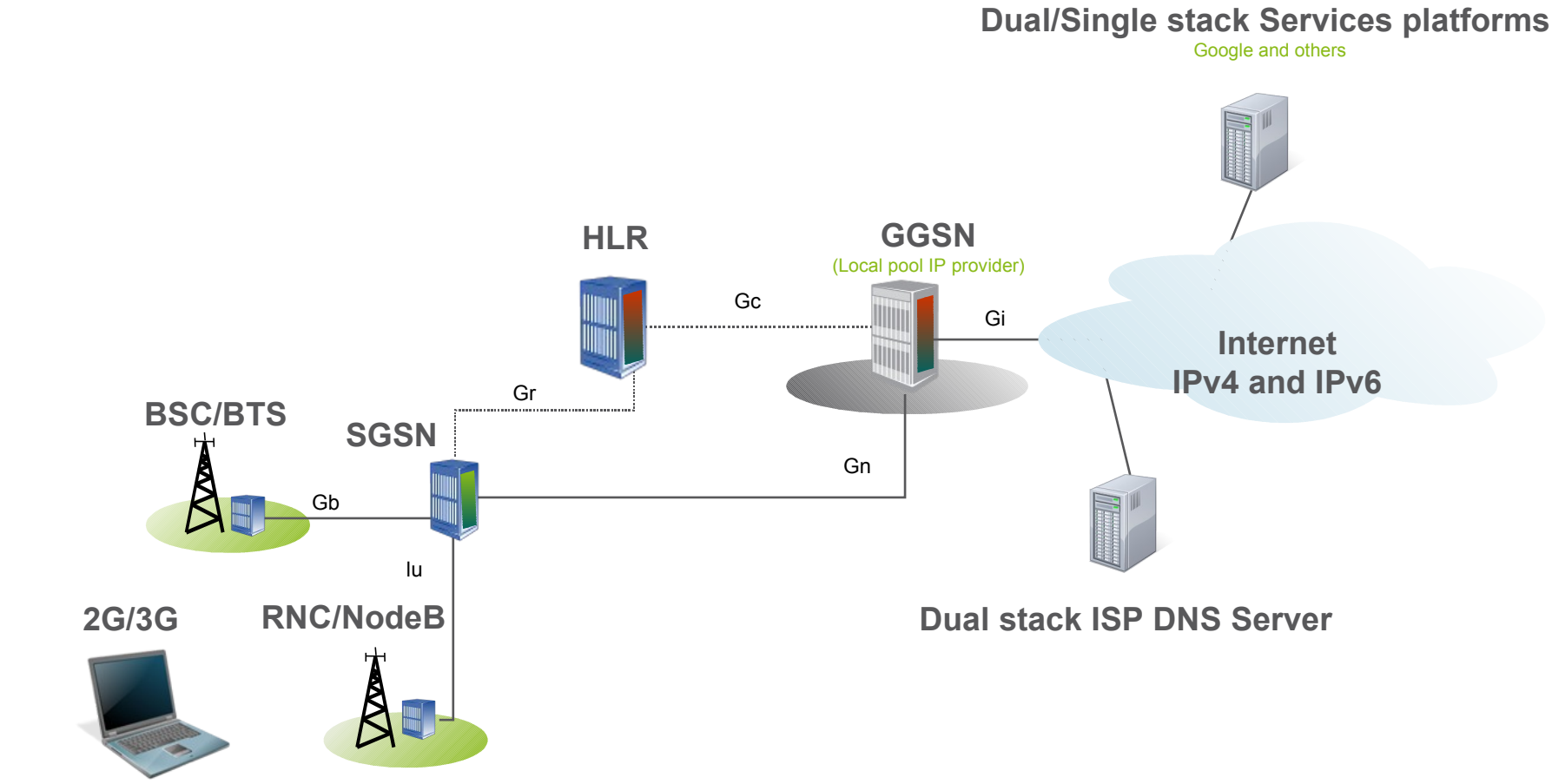
Very Basic IPv6 deployment In mobile packet core

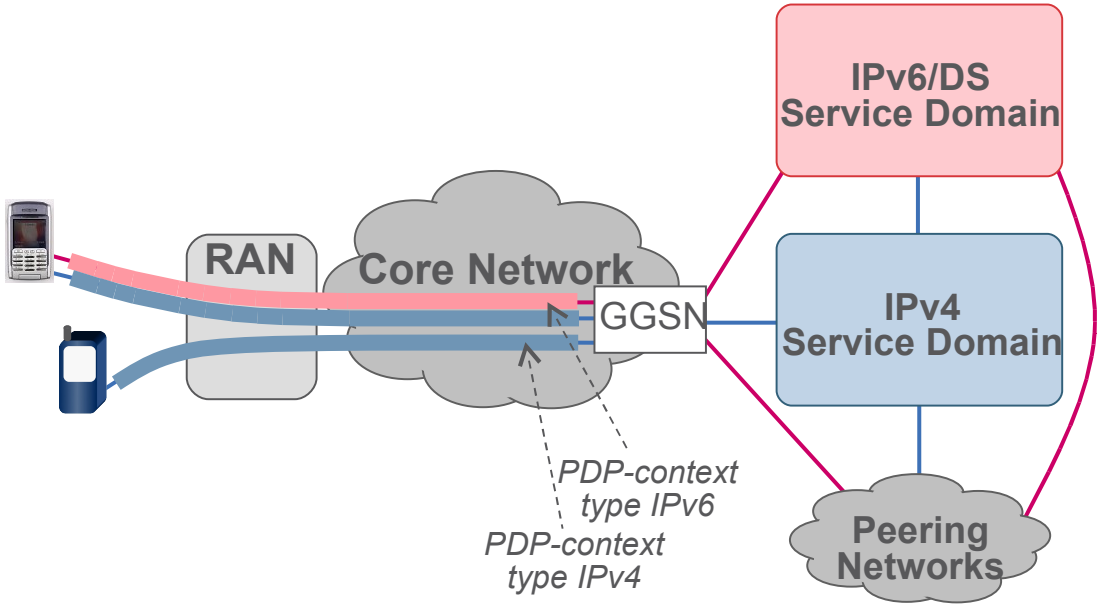
- Demonstrate basic IPv6 user traffic
- Even if it is basic it could provide a powerful IPv4 address space offload if combined with NAT44 and IPv6@Google
- Setup
  - Off the shelf DELL Laptop with Ericsson Mobile Broadband Module
  - IPv6 enabled APN in GGSN (Actually IPv4+IPv6 APN) at Swedish mobile operator Teliasonera
  - Subscription with IPv6 PDP Type and IPv4 PDP Type in HLR
  - Possibility to create two simultaneous PDP Contexts to get dual stack Internet connectivity
  - Dual stack IPv6 DNS for Internet, participating in IPv6@Google
  - Service Platforms are Google and other dual/single stack sites on the Internet

Proof of concept Network SETUP



Dual stack connection setup

- For now two simultaneous PDP contexts needed, one for each IP version. With E/// GGSN same APN can be used for both IP version (E/// GGSN feature) – THE WORKAROUND
- Default APN can be made dual stack == Still Zero user configuration



- For 3GPP Release 8 MS/UE and Release 8 (EPC) Core or Release 9 (GPRS) Core, one PDP Ctxt/PDN Connection can handle both IP versions – THE SOLUTION

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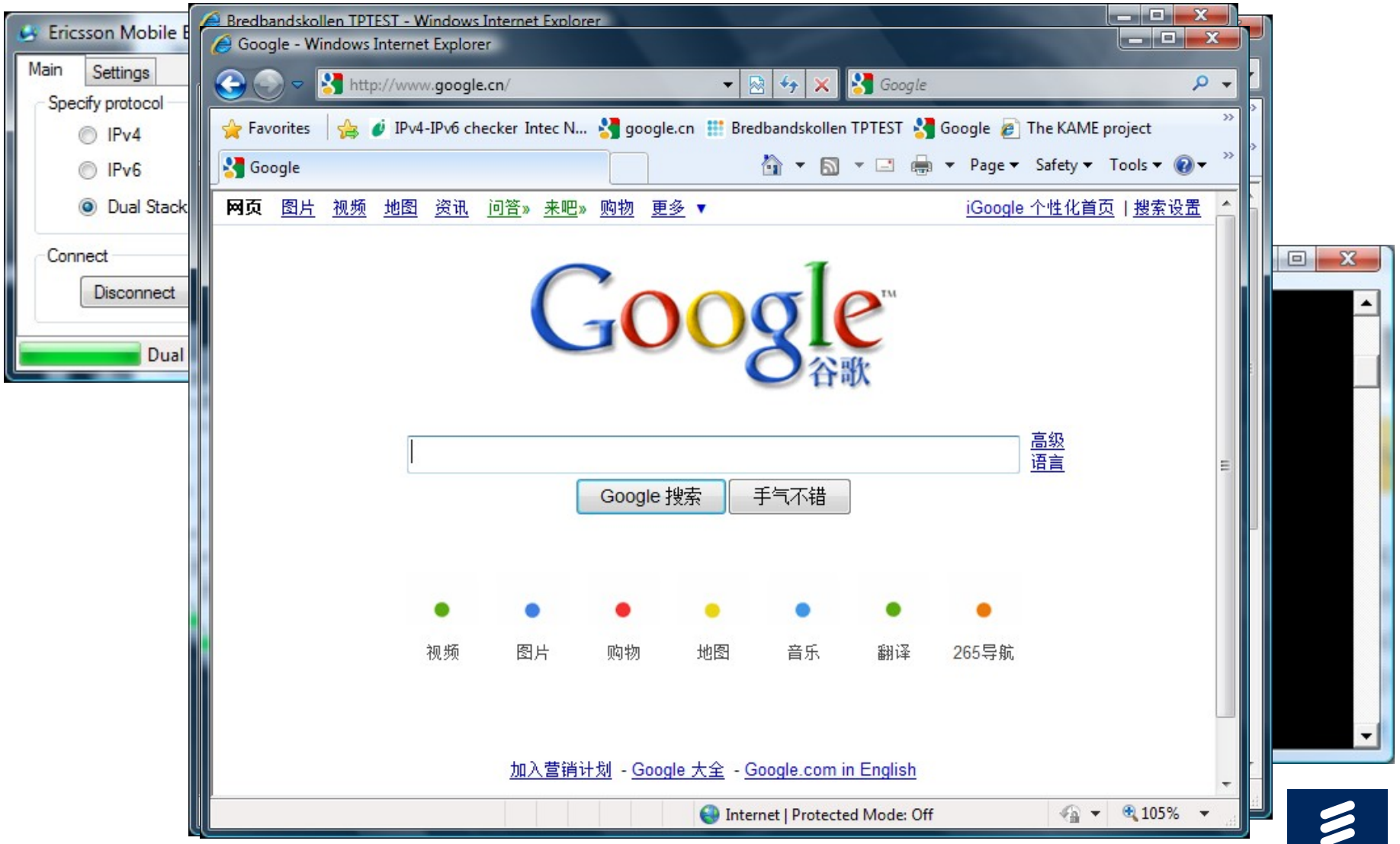
So what does this look like



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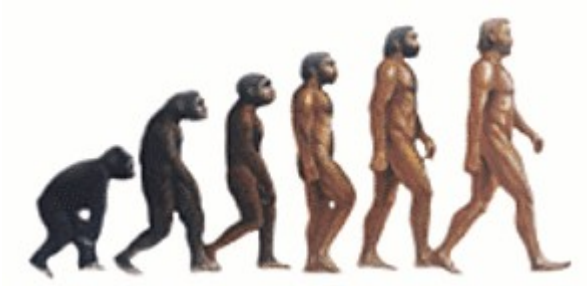
The evolution of IP



IP has an evolution path, lets not jump ahead. There will be branches for sure, some will die and some will live on, time will tell....

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New opportunities

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Don't ask what IPv6 could do for IPv4, ask what IPv6 can do for you!

- Solving IPv6 interoperability with IPv4 may seem a daunting task..
- Instead turn your attention towards the many ”Greenfield” areas where a native IPv6 environment can have immediate benefits
- Let me give you some ideas where to start.....

Take the red pill
...or the blue pill?

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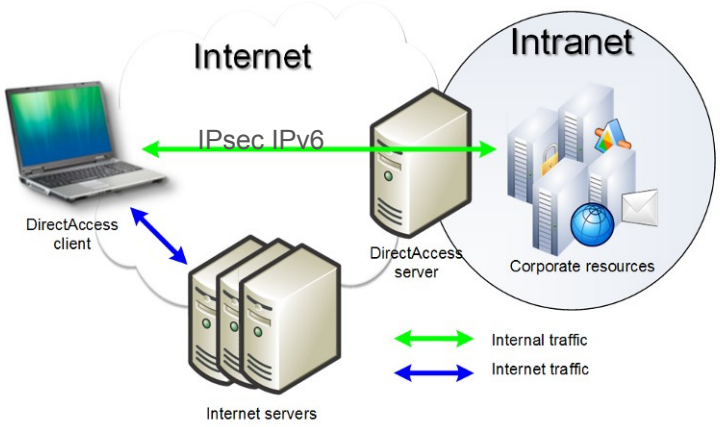
Enterprise Access

- Native IPv6 to Enterprise networks
  - Using dedicated corporate APN
  - Using public IPv6 Internet and IPsec tunneling
- Clean approach using basic IPv6 user payload and Gi interworking with ISP or Enterprise backbone.
- IP addresses given by GGSN local pool or Radius Interworking
- Microsoft DirectAccess approach to do seamless network user experience. ”Internet is our Intranet” *Bernard Ourghanlian, le directeur technique et sécurité de Microsoft France*



Walled Garden Services

- Services and users reside within a contained environment - ”Walled Garden”
- One IP version. No IP version Interworking functions within the ”Walled Garden” (but maybe to peering networks.)
- IPv6 deployment may be OPEX driven
- Offloads IPv4 address space usage.
- Some Examples:
  - M2M and Sensor networks
  - IMS (possible due to defined IP version Interworking)
  - MIA/MID - Mobile Internet Appliances/Devices
  - IPTV
- Note: IPv4 ”Walled Garden” is already widely used (for example in fixed network IPTV)

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Conclusions

It’s all about Making IPv6 happen

- 3GPP standard based live mobile networks are ready now. Work with what you got, no need to wait anymore, no time to wait either;-)
- Take baby steps, but plan for when you need to run
- Deployment is not a subject to discuss, it is an action to do
- Deployment is a community effort with benefits for all in the long run. We are deploying Internet again, and it was a success the last time.... Right?
  Lets make internet into an evernet instead of a nevernet!
  Get connected whenever to wherever forever!
- It is not another IP protocol, just a new version.

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It is still IP but...

...there are two versions

LIVE Network DEMO

Dual stack roaming connectivity from here to sweden

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Dual stack IP in 3GPP cellular network demo in Shanghai

Connected to home operator Teliasonera from roaming operator in China using only commercial networks and ”off the shelf” equipment. It just works!

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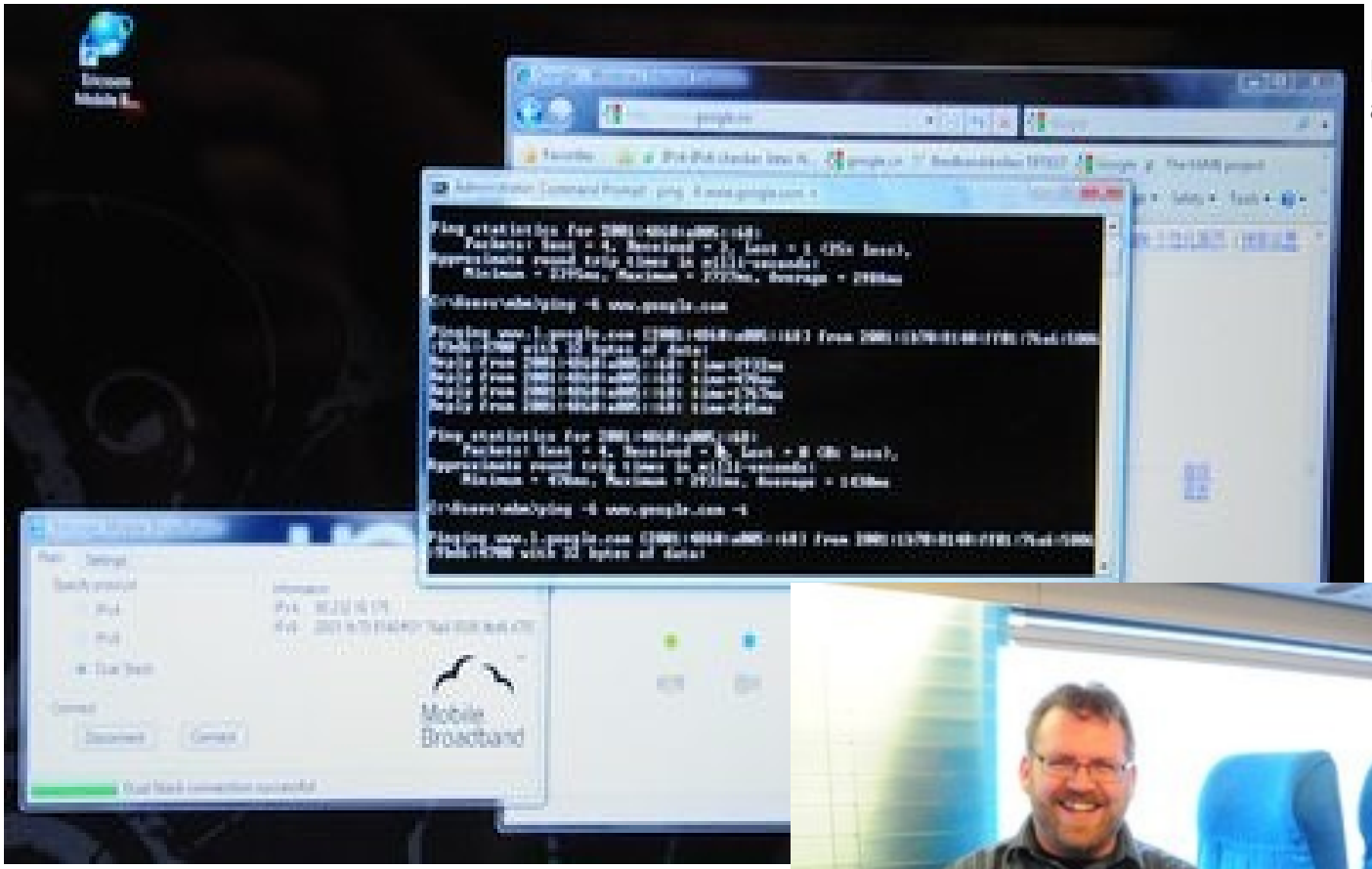


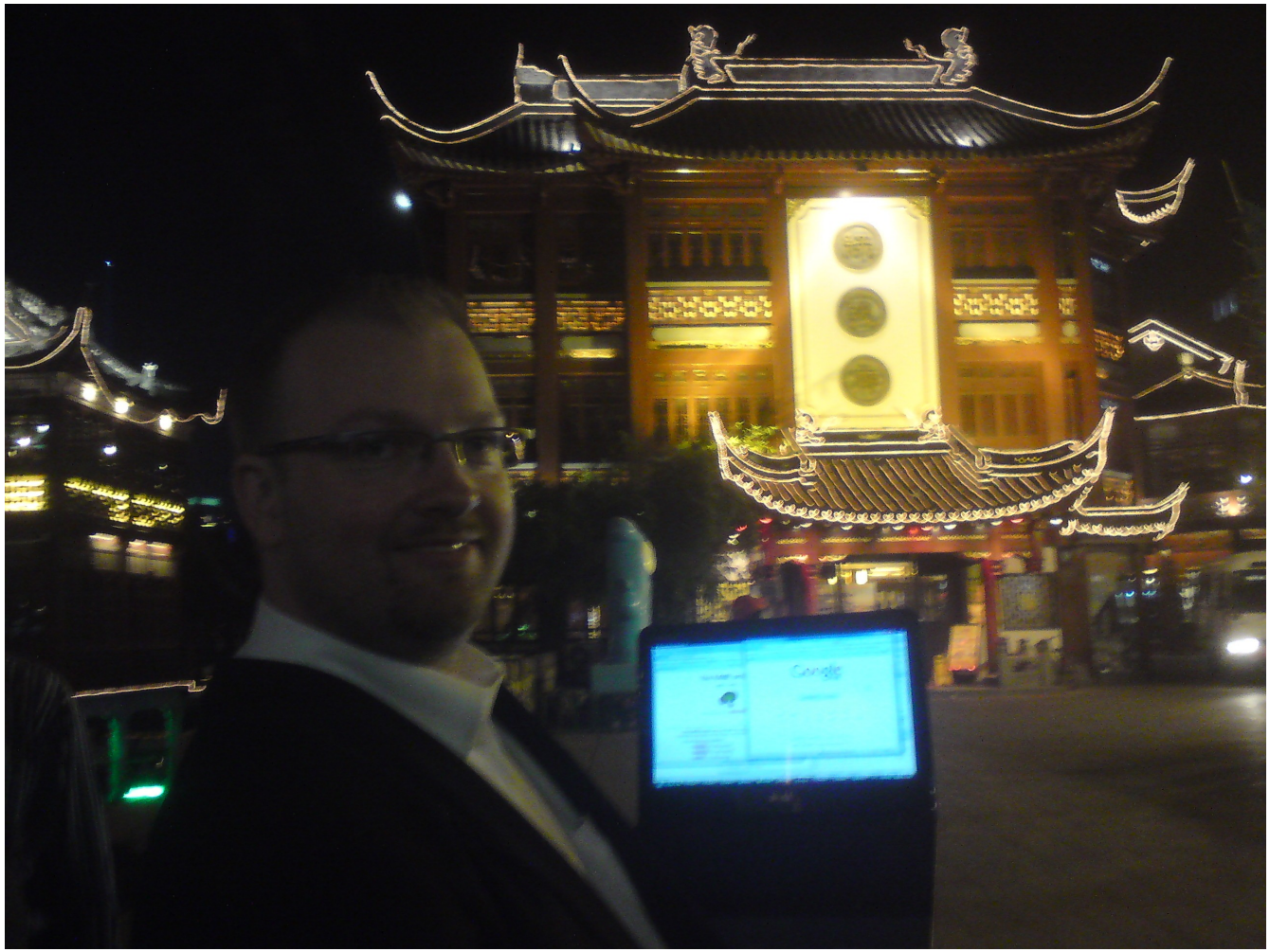
Dialer, www.google.cn over IPv6 and pinging www.google.com!

Dual stack roaming cellular connection onboard the MAGLEV train at 301km/h in Shanghai!

Photos by Jari Arkko

Happy engineers!

3G Dual stack IPv4/IPv6 BY Night In Shanghai – no strings attached :-)



Chinese Google www.google.cn and IPv6 Dancing Kame www.kame.net

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