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Advances in IPv6 Mobile Access

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Deployment approaches

Dual-stack approach is the most customer-friendly solution for **transitioning to IPv6**

Dual-stack is also the standard approach (3GPP) and appears to be the most favored approach

IPv6-only transition solution based on **protocol translation** can cause **service discontinuity**, and is only an option for specific cases due to discrete reasons

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Details of dual-stack

3GPP release-8 introduced a new bearer type: IPv4v6

IPv4 and IPv6 bearers can be used in parallel when IPv4v6 is not supported (since 3GPP release-99)

Various **fallback** scenarios are involved that are not present with IPv4-only devices, e.g. **IPv4v6 -> IPv4 & IPv6**

References: 3GPP release-8 23.060, 23.401
draft-ietf-v6ops-3gpp-eps

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Details of IPv6-only

Everything, including applications, **MUST BE IPv6 enabled – otherwise solutions such as NAT46 on a host (aka BIH) may be needed**

IPv6 is not always available: no support on visited network, blocked on purpose due lack of roaming agreements.. **Fallback** support to IPv4-only mode is mandatory

This is pretty much **the end-scenario** world is transitioning towards

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IPv6 in standards

Key specifications and standards are complete and matured for handset productization and deployment

Additional features and improvements are actively researched, developed, and standardized. Nokia participates, for example, to: IPv6 protocol maintenance, Multi-Interface improvements, IP mobility solutions, protocol translation topics, and Happy Eyeballs

IPv6 on handsets

IPv6 support required by the business

IPv6 support on the applications

IPv6 support on APIs

IPv6 support on the connection manager

IPv6 support on the TCP/IP stack

IPv6 support on the modem

Status of terminals

IPv6 business case – benefits vs costs

Browsers, email, instant messaging, VoIP, gaming, utilities, various middleware entities such as HTTP and so forth...

Posix, Qt, Java, Symbian, etc OS APIs

Ability to manage IPv6 activation and links

Symbian, OS/X, Linux (derivates), Windows, Nokia S40..

Renesas, Qualcomm, ST-Ericsson, GCT, Broadcom, Icera, Marvell, Infineon, MediaTek..

IPv6 on mobile access networks

- Closed IPv6 trials at least since **2003**
- First commercial IPv6 deployments at **2010**
  - While many operators are conducting internal (lab) trials
- Public trials and some commercial deployments occurring during **2011**
  - Even more operators are trialing
  - Number of cellular IPv6 capable devices also increasing

- And things are getting even better for **2012 !**

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IPv6 tethering

Traditional **dial-up** style IPv4 tethering uses dedicated PDP context for the dial-up

Advanced IPv4 tethering, e.g. personal Wi-Fi hotspot solutions, often use **NAT** and **DHCP** to allow sharing of the same IPv4 PDP context with internal applications

Traditional **dial-up** is possible also with IPv6

IPv6 does not use NATting, but instead **Neighbor Discovery Proxy** "bridging function" that does not require explicit network support, or explicit and more proper **DHCPv6 Prefix Delegation** as is defined in 3GPP Release-10

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Bridging and DHCPv6 illustrated

*"Bridging" with **Neighbor Discovery Proxy** – no explicit network support is required!*

PDN GW

PDP

2001:0db8:0:1::/64

f("proxy")

Same prefix on both links

2001:0db8:0:1::/64
WLAN

***DHCPv6 Prefix Delegation** – support included in 3GPP since Release-10*

PDN GW & DHCPv6 server

PDP

2001:0db8:0:1::/64

f("router")

Handset
(possibly with DHCPv6 server)
Delegated e.g. 2001:0db8::/56

2001:0db8:0:81::/64
WLAN

f("router")

2001:0db8:0:C1::/64
WLAN

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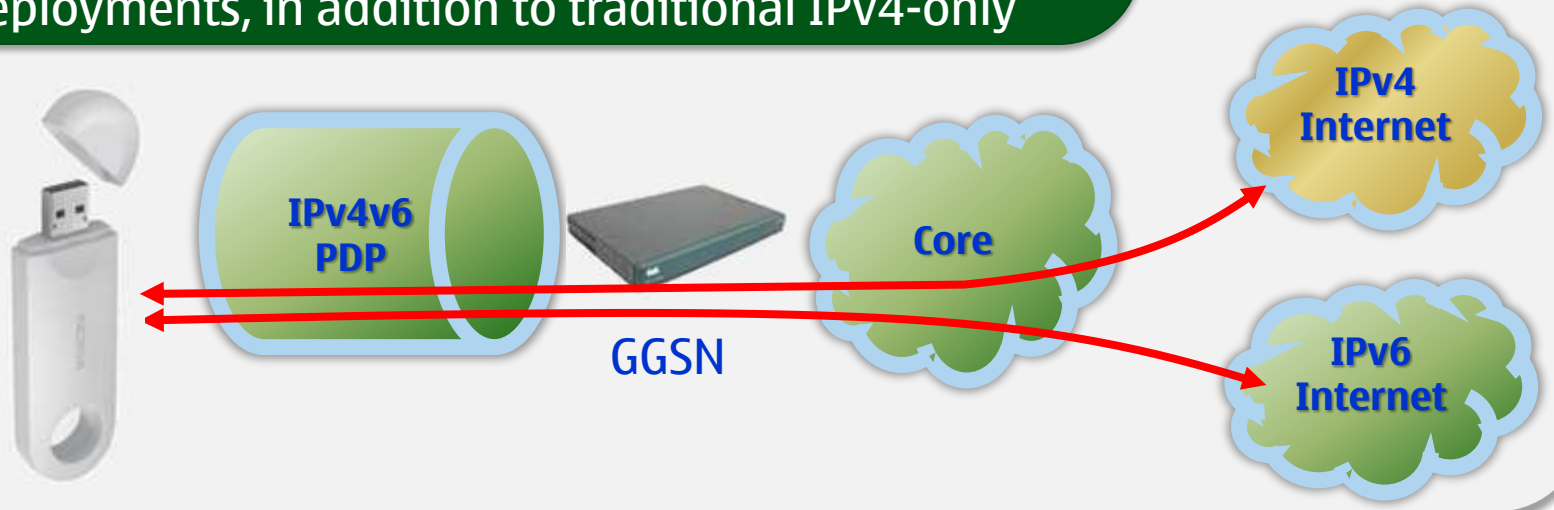
Nokia USB modem 21M-02

21M-02 supports IPv4v6 PDP type on 3G access. The modem also supports automatic fallback logic to parallel IPv4 and IPv6 PDPs when IPv4v6 is not available. Supports Windows, OS/X, and Ubuntu OSes.

Read more behind this link

21M-02 can be used in commercial IPv4v6 and IPv6 deployments, in addition to traditional IPv4-only



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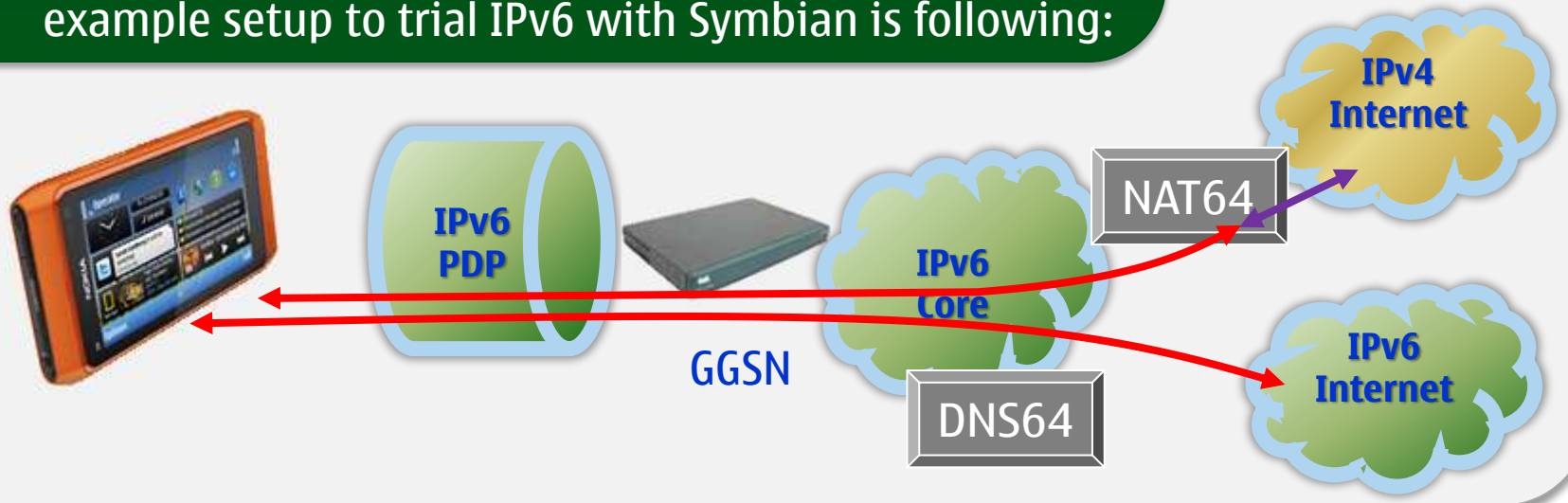
Symbian and testing IPv6

Symbian supports IPv4/IPv6 hybrid stack

Currently each application can use IPv4 or IPv6 cellular access but not both simultaneously (this limitations is not present on WiFi access)

Majority of applications are already IPv6 enabled

Symbian devices are used for IPv6 trials, and an example setup to trial IPv6 with Symbian is following:



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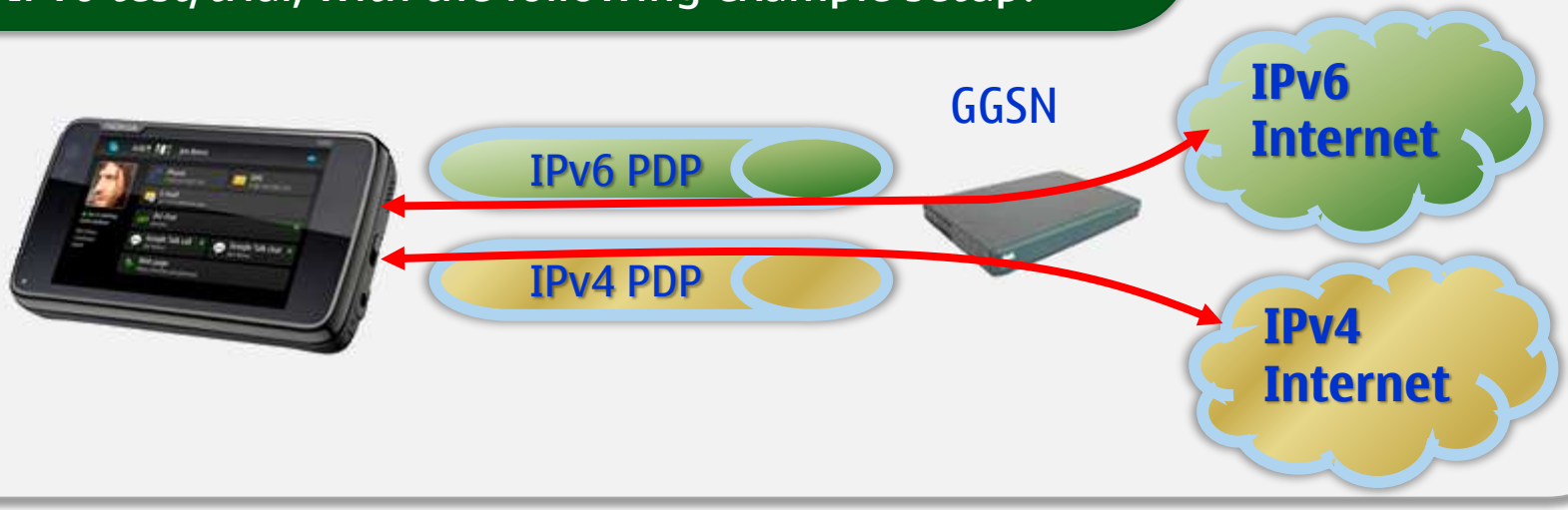
Modified N900 for testing IPv6

IPv6 add-on (provided by Maemo community) enables dual-stack in 3G and WiFi accesses for trialing/testing purposes

IPv4 & IPv6 PDP contexts opened for same/different APNs

Maemo5 devices (with the add-on) are also used for IPv6 test/trial, with the following example setup:



IPv6, WiFi offloading and ICT SHOK Future Internet program

WiFi offloading is a hot topic in cellular industry as means to extend the overall network capacity

Topic in **ICT SHOK Future Internet** program **Work Package 1**:"Multipath and routing evolution" activity 1.2 "Terminal Network Interaction", and also in **3GPP, IETF, and Wi-Fi alliance HotSpot 2.0** organizations

ICT SHOK Future Internet consist of following industry partners: TIVIT, CSC – IT center for science, Ericsson, Nokia, Nokia Siemens Networks, F-Secure, Stonesoft, Cybercube, TeliaSonera and research partners: HIIT, Aalto, TUT, UH, VTT, OY, JYU, UTU and is supported by TEKES

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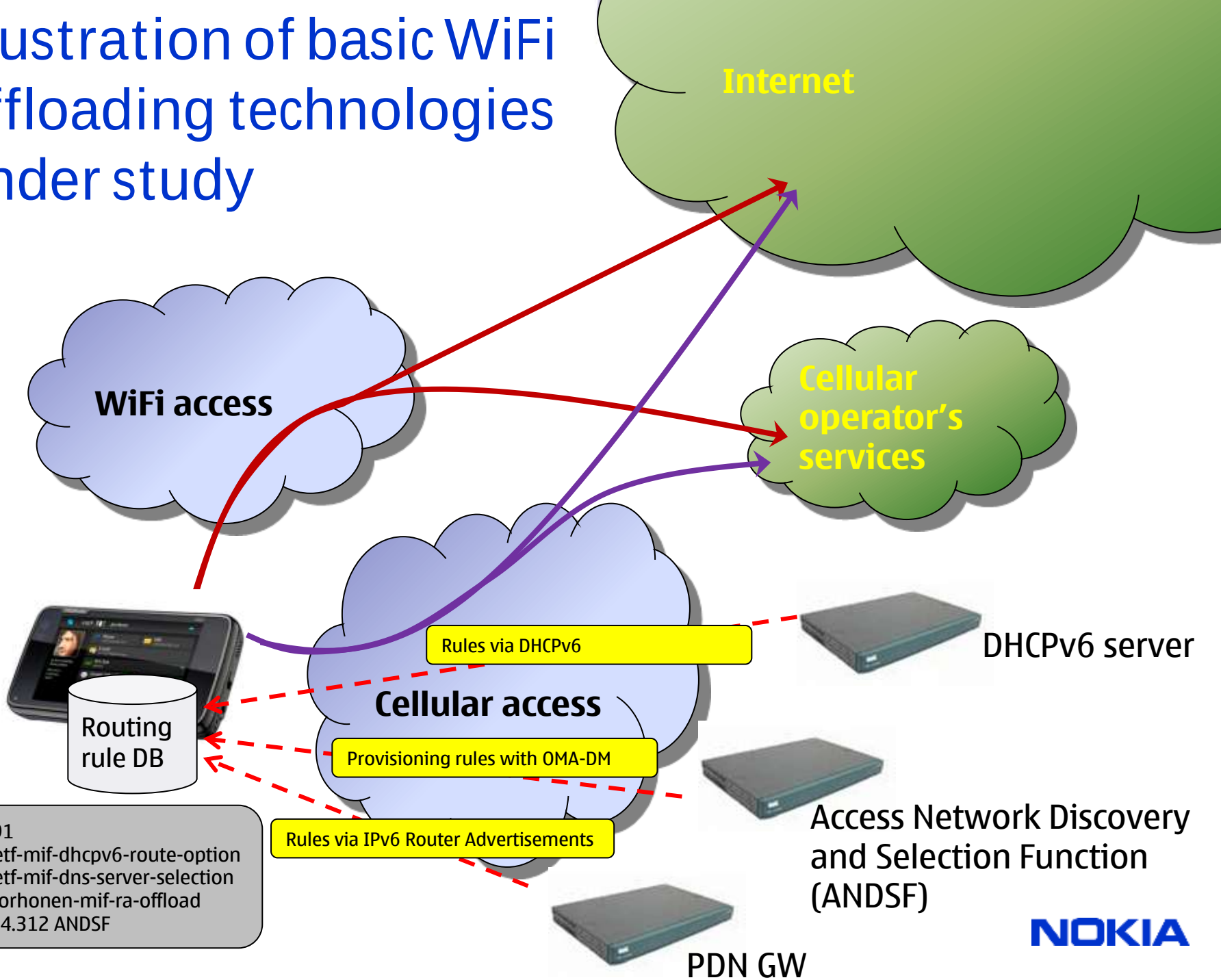
Illustration of basic WiFi offloading technologies under study



Q & A

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