Future Internet WP1 Pizza

Access Selection Steering and Multi-Access Showcase

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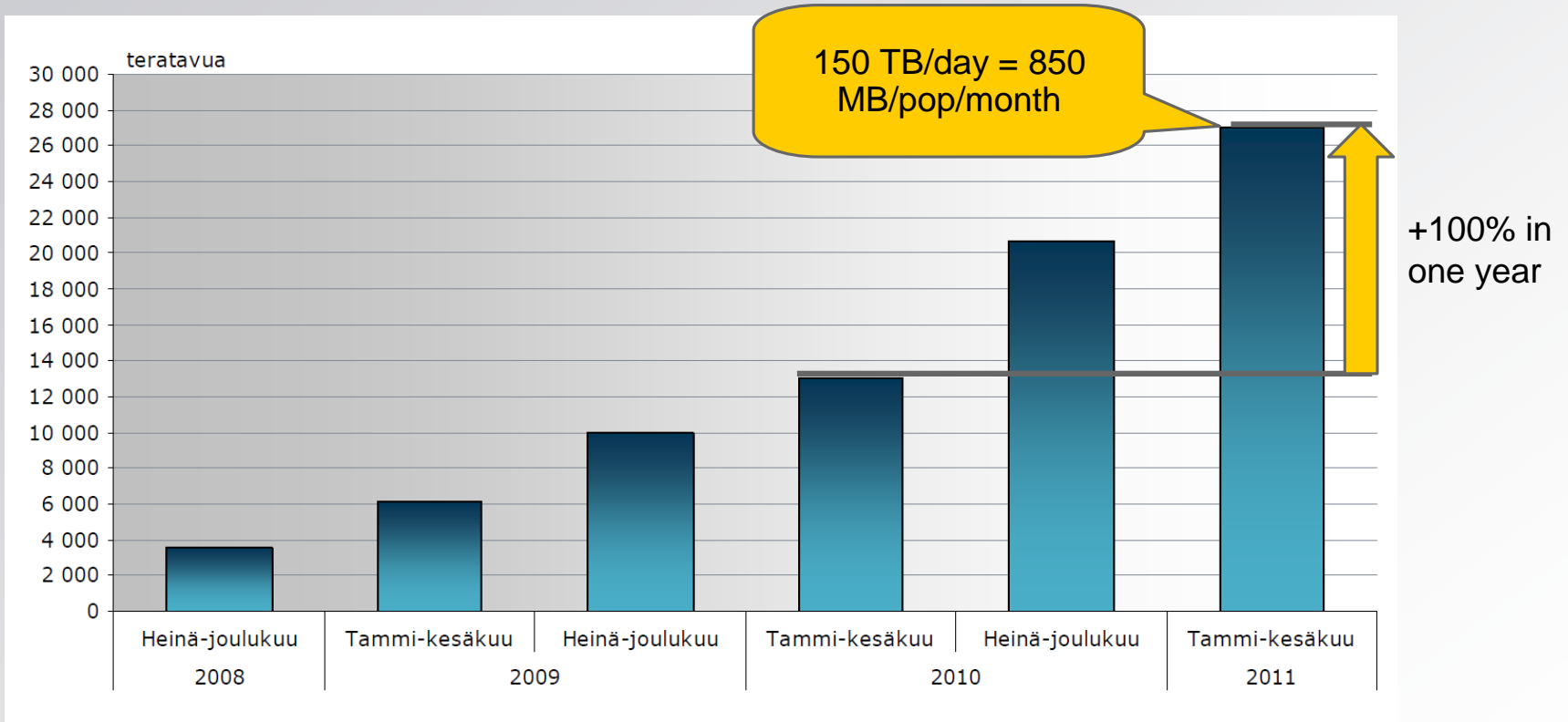
VTT / Teemu Rautio, Markus Luoto

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Outline

1. Background

2. Access Selection Steering

3. Multi-Access Showcase

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Mobile Data Growth Figures

- Mobile data growth continues without no signs of calming down
- Data volumes in Finnish mobile networks:

Source: http://www.ficora.fi/attachments/62QK8WRmW/Markkinakatsaus_3_2011.pdf

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Data Volume is 28x Voice Volume

Mobile Data volume evolution

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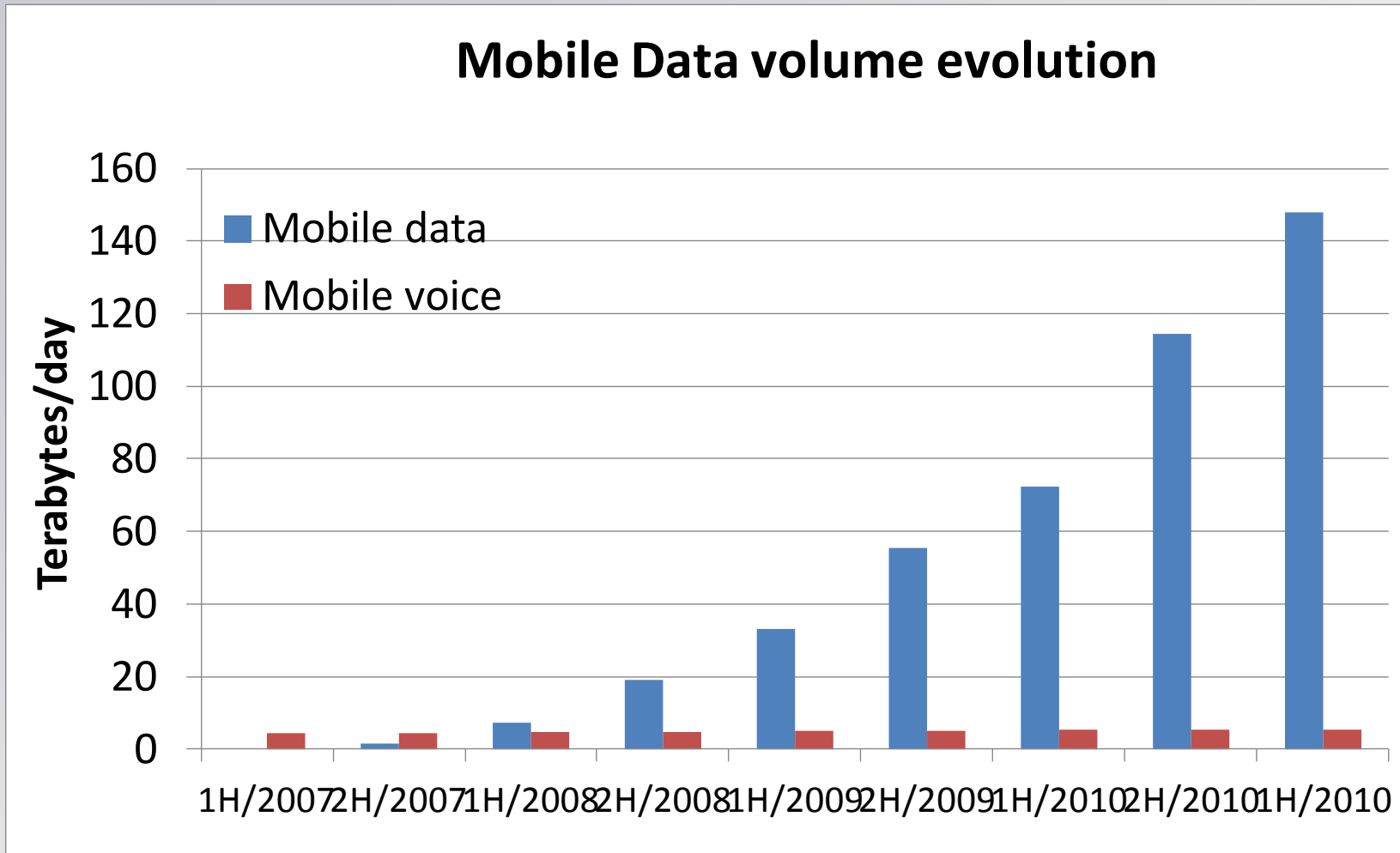
Challenges for the Operators:
How to increase Network Capacity?

- Mobile data grows, revenues not
- The majority of traffic originates indoors, e.g. from home
- Most of the new devices support Wi-Fi
- For small-cells segment, Wi-Fi is reasonably cheap to deploy and operate

▶ **Operators are highly interested in Wi-Fi offloading**

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Why to have Access Selection Steering?

- Cellular networks are fully NW-controlled for access selection

- For Wi-Fi, the device is in charge
    - However, operators do want to have some degree of control also for Wi-Fi usage!
    - For example, an operator wants its subscriber to use the operator's own Wi-Fi network, or partner's network
    - Operators are free to decide how their networks are used

- Different mechanisms:
    - 3GPP ANDSF
    - Wi-Fi Alliance HotSpot 2.0
    - IETF mechanisms
    - FI deliverable D7 "Study on Access Selection Steering Mechanisms" considers those

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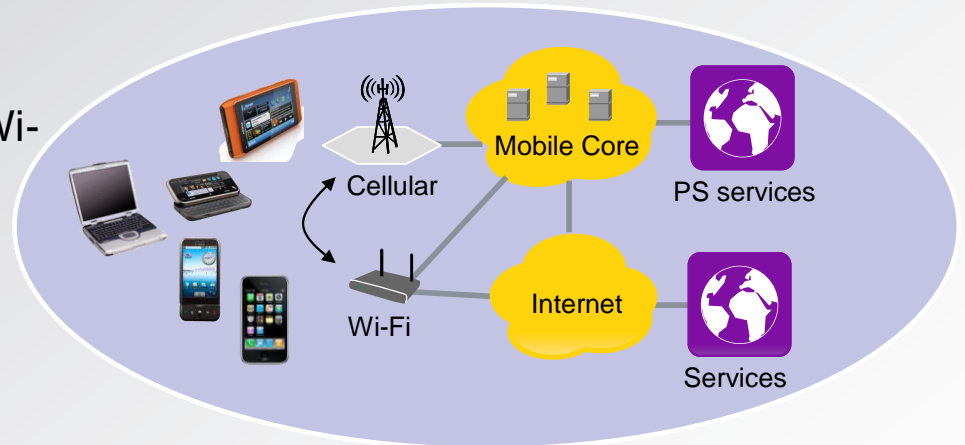
Access Selection Steering Mechanisms, ANDSF

- The ANDSF server is a network element that can provide network discovery information and access network selection policies to the UE via existing IP connections
  - The OMA DM (Device Management) framework is used to define and provide the ANDSF information and policies to UEs
  - It is optional to deploy and use ANDSF, the UE's internal configuration has a precedence over ANDSF policies

- **ANDSF enables cellular operator to influence also non-3GPP access network usage**

Example ISRP policy:
For YouTube traffic, select the access:
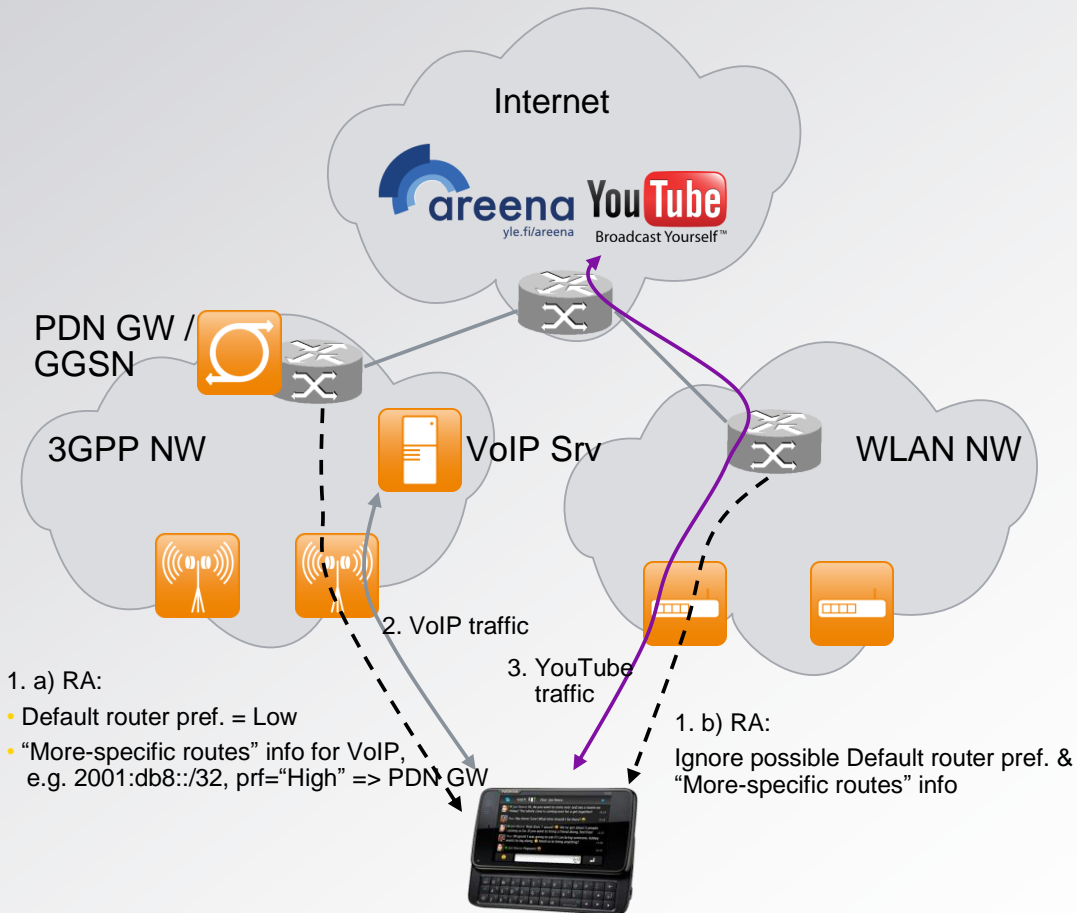1. Wi-Fi with SSID=Cafe
2. Wi-Fi with SSID=Operator
3. Cellular access

ISRP Policies

ANDSF

Cellular

Mobile Core

PS services

Wi-Fi

Internet

Services
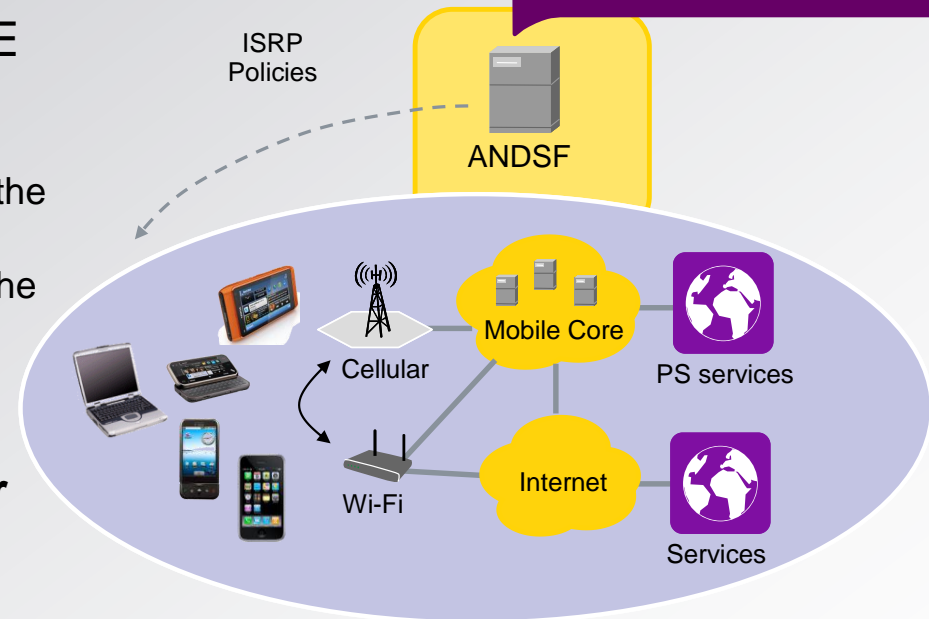
ANDSF – Access Network Discovery and Selection Function

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Access Selection Steering Mechanisms, IETF

- Within IETF, there are a number of mechanisms suitable for access selection steering, e.g.
  - Router Advertisement (IPv6)
  - DHCPv6, DHCPv4
- The basic logic is the same for all mechanisms:
  - Network tells to the device what first hop router should be used for certain traffic / all traffic
  - When having first hop router(s) behind different radio accesses, it is possible to steer some traffic via Wi-Fi while some other traffic goes through cellular access
- However, IETF mechanisms can only be used *after* a connection is established, i.e. some other mechanism needed for initial access selection

Internet

areena
yle.fi/areena

You Tube
Broadcast Yourself™

PDN GW / GGSN

3GPP NW

VoIP Srv

WLAN NW

2. VoIP traffic

3. YouTube traffic

1. a) RA:
- Default router pref. = Low
- "More-specific routes" info for VoIP, e.g. 2001:db8::/32, prf="High" => PDN GW

1. b) RA:
Ignore possible Default router pref. & "More-specific routes" info
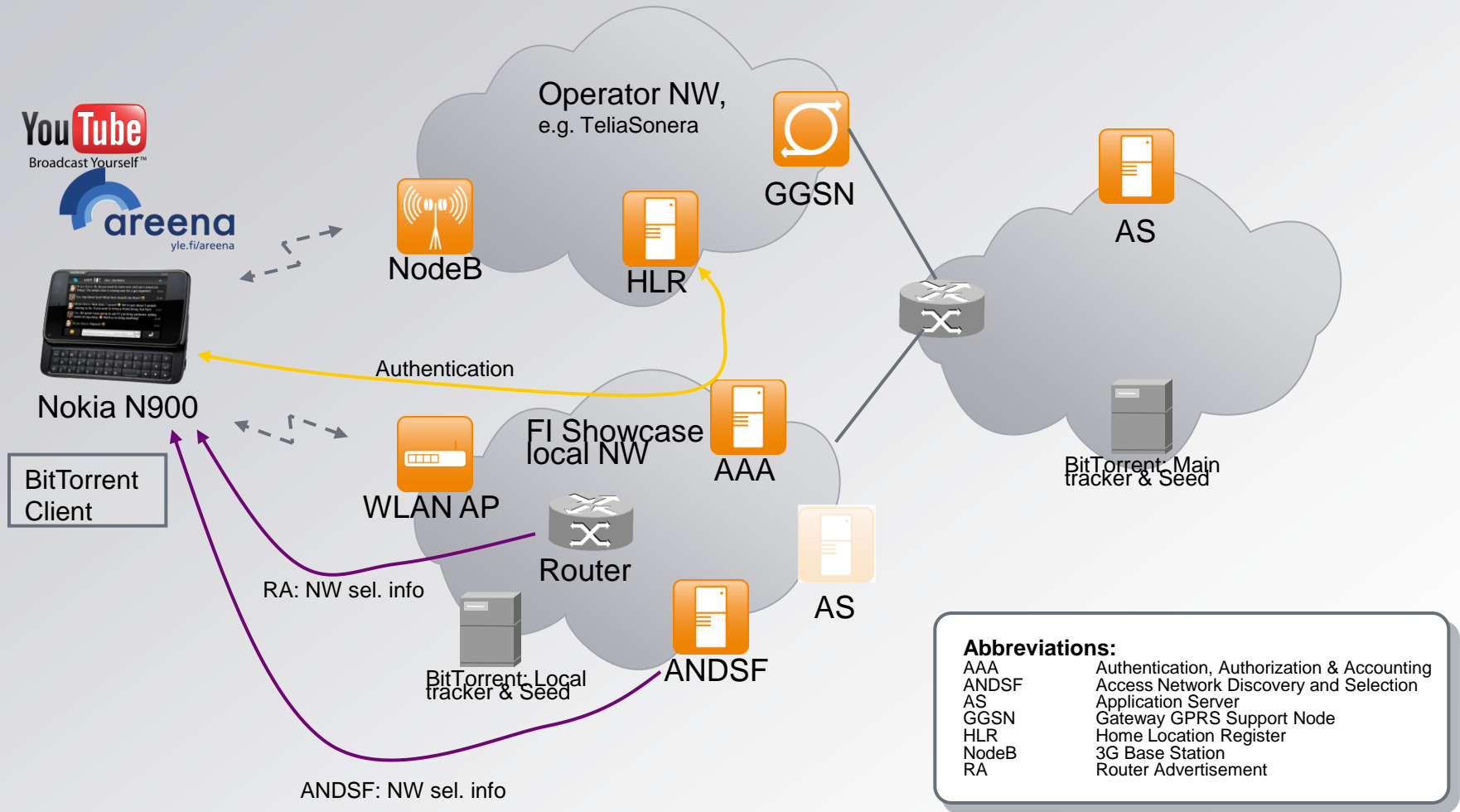
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Multi-Access Showcase

- Nokia, NSN and VTT are co-operating in developing a Multi-Access Showcase for FI WP1

- The idea is to demonstrate the access selection steering mechanisms in practice with BitTorrent as user application

- Further, VTT has implemented enhancements on BitTorrent client and these can be demonstrated with the showcase setup

  – The client reacts to changes made by the access selection steering mechanisms by initiating a new peer resolution process.

  – As a result, the client retrieves the content from the closest source in the selected access network (i.e. uses only the preferred network).

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Multi-Access Showcase Architecture

Operator NW, e.g. TeliaSonera

GGSN

NodeB

HLR

AS

YouTube
Broadcast Yourself™

areena
yle.fi/areena

Nokia N900

BitTorrent
Client

Authentication

FI Showcase
local NW

AAA

BitTorrent: Main
tracker & Seed

WLAN AP

Router

AS

RA: NW sel. info

BitTorrent: Local
tracker & Seed

ANDSF

ANDSF: NW sel. info

Abbreviations:

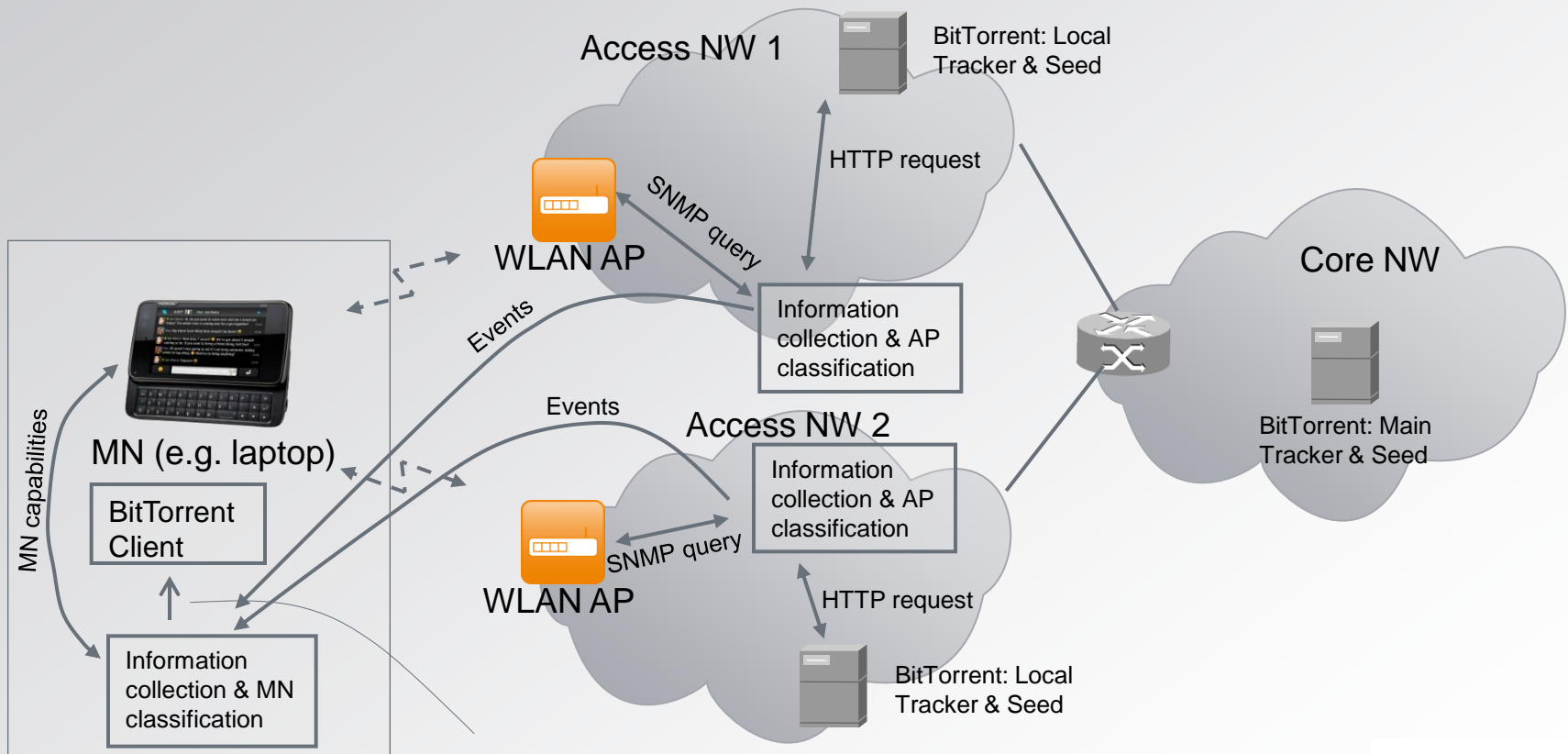|	
AAA	Authentication, Authorization & Accounting
ANDSF	Access Network Discovery and Selection
AS	Application Server
GGSN	Gateway GPRS Support Node
HLR	Home Location Register
NodeB	3G Base Station
RA	Router Advertisement

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Multi-Access Showcase with Distributed Decisions

- VTT is implementing an additional Showcase Scenario, to validate distributed decision mechanisms e.g. for access selection.

- Access selection uses three-tier fuzzy-based network classification method (AP capabilities, MN capabilities and Application capabilities in the particular network).

- In this scenario preferences about available wireless networks is provided by Distributed Decision Engine (DDE).

- DDE is concept, which can collect and distribute information, and make decisions with suitable algorithms (in this context we use fuzzy logic).

- With Distributed Decisions it is be possible to perform load balancing/offloading based on network load and operator policies.

- How distributed decision mechanism interoperate e.g. with ANDSF and MIH is an ongoing work item.

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Multi-Access Showcase Scenario Architecture with Distributed Decisions

- The BitTorrent client interactively reach changes in the network selection preferences via DDE. Based on the preferences client may use two access networks simultaneously or only the best access network.