HSDPA and 1xEV-DV Harmonization Opportunities

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Present Situation

- OHG Harmonization resolved some of the issues but was not successful in creating a single technology
- WCDMA and cdma2000 are continuing to diverge both in IP core network and radio access
  - 3GPP is currently developing HSDPA
  - 3GPP2 is developing evolved version of 1xRTT for voice and data (1x EV-DV)

There are many similarities between HSDPA & 1xEV-DV

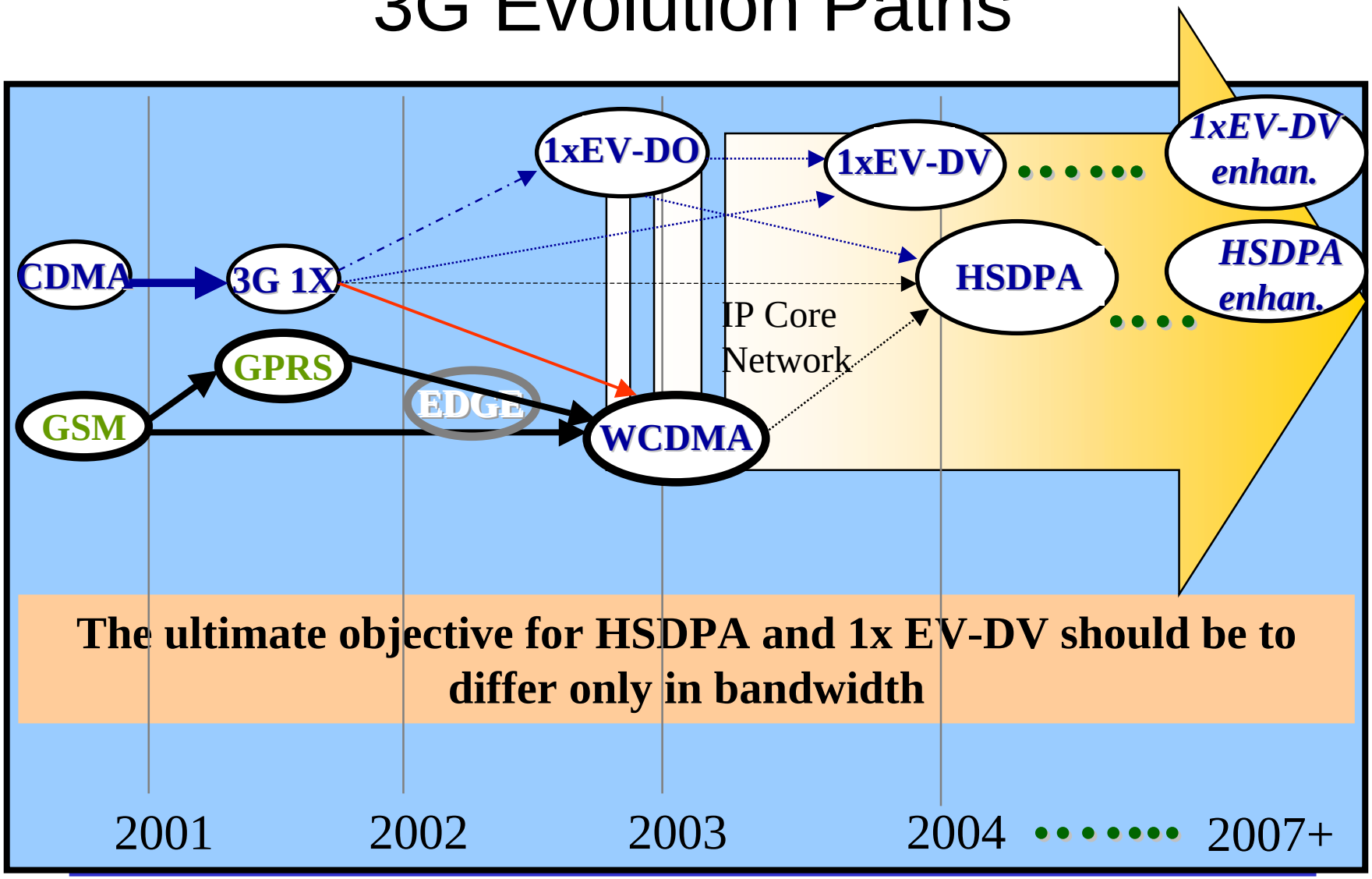
HSDPA vs. 1xEV-DV

- Both technology enhance downlink packet data performances
- HSDPA and 1xEV-DV are based on the same set of technologies to improve spectral efficiency for data services:
  - shared downlink packet data channel
  - high peak data rates: using high-order modulation (16-QAM, 64-QAM) and AMC (adaptive modulation and coding)
  - HARQ retransmission schemes
  - fast scheduling for packet data
  - shorter frame sizes
- 1xEV-DV also has proposals to enhance uplink Performance

Technical Enablers for HSDPA and 1xEV-DV Forward Link - Current view

Enabler	HSDPA	1xEV-DV
Downlink Frame Size	2ms TTI (3 Slots)	1.25, 2.5, 5, 10 ms Variable Frame Size (1.25 ms Slot size)
Channel Feedback	Channel quality reported at 2ms rate or 500 Hz	C/I feedback at 800 Hz (every 1.25 ms)
Data user multiplexing	TDM/CDM	TDM/CDM (variable frame)
Adaptive Modulation and Coding	QPSK & 16-QAM Mandatory	QPSK, 8-PSK & 16-QAM
Hybrid-ARQ	Chase or Incremental Redundancy (IR)	Async. Incremental Redundancy (IR)
Spreading Factor	SF=16 using UTRA OVSF Channelization Codes	Walsh Code Length 32
Control Channel Approach	Dedicated Channel pointing to Shared Channel	Common Control Channel

3G Evolution Paths



The ultimate objective for HSDPA and 1x EV-DV should be to differ only in bandwidth

Observations - 3G Evolution Paths

- The GSM path includes deployment of GPRS as an interim step to WCDMA and HSDPA
- The cdmaOne path includes deployment of 1xRTT as an interim step to 1xEV (Data Only, Data and Voice phases)
- CDMA operators have the choice of going to WCDMA but have to resolve the issues of the core network evolution and of spectrum availability

The goal is to give operators flexibility to evolve to either technology as appropriate

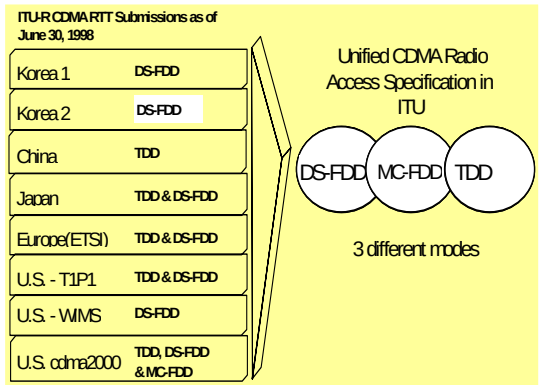
Opportunities

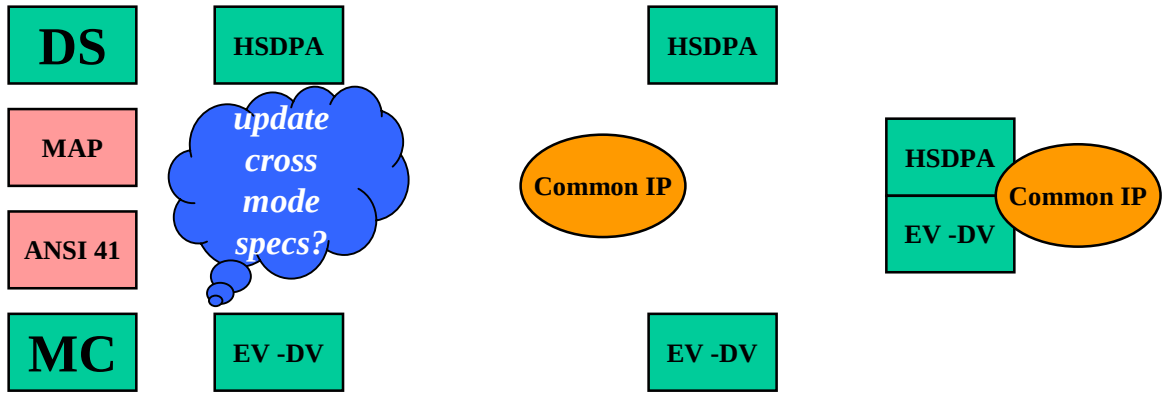
- There is an opportunity for harmonization before they are standardized
- The ultimate goal should be to achieve minimal differences now, e.g. the five in the Toronto agreement, and a single access at a future date
- Harmonization now would allow operators to choose W-CDMA and 1x EV-DV depending on the amount of radio spectrum available to them
  - WCDMA and 1xEV-DV have similar spectrum efficiency
- One common IP Core Network should be developed for all future radio access standards

Harmonization of High Speed Data Services

- Analyze possible common technical paths for High Speed Data solutions in 3GPP/3GPP2
- Beneficial from technical, economical and business point of view
- Strike a balance between target completion dates, relative benefits and performances

Progression of IMT 2000 - Physical Layer Harmonization Opportunities





1999
OHG Harmonisation Chip Rate Different

2000

2002
List of Common features?

2005
Common Chip Rate denominator?

2007 +
Spectrum Commonality (physical layer)

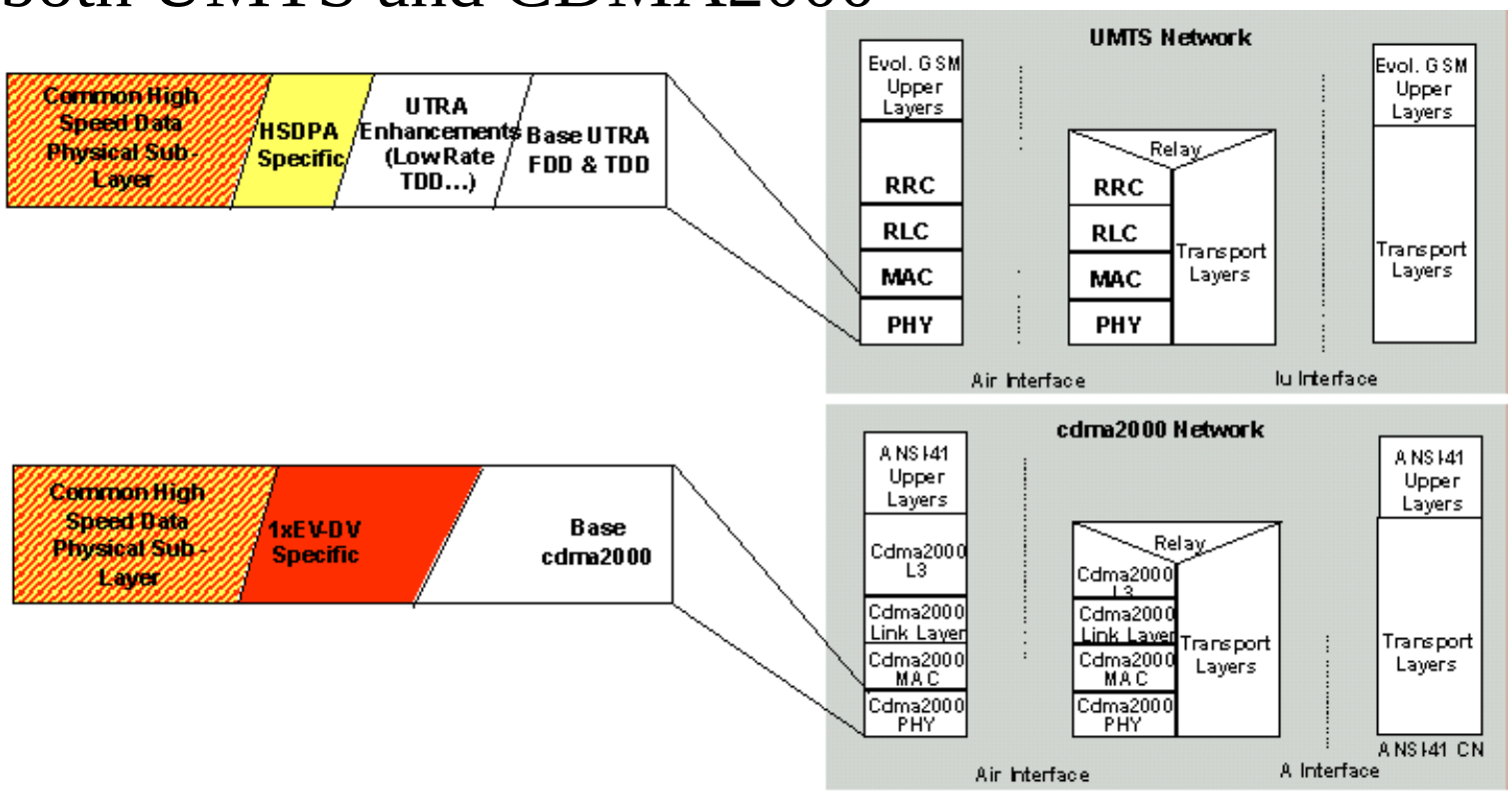
Main focus of this meeting

Proposed Harmonization Alternatives

- ***Alternative #1***: Extension of the OHG agreement to cover hooks and extensions for the high speed data solutions
- ***Alternative #2***: Alternative 1 + agreement on a common set of mandatory and optional parameters (based on review of key technical enablers).
- ***Alternative #3***: Alternative 2 + agreement on a common physical sub-layer for high speed data solutions

Harmonization Alternative #3

- Define a common physical sub-layer adopted by both UMTS and CDMA2000



Harmonization Alternative #3 - Two Approaches

- Review a list of physical layer elements for consideration of the common physical sublayer
  - frame/slot structure, chip rate, multiplexing scheme, channelization and spreading codes, modulation, channel coding, power control management, etc.
- Two options (wideband/narrowband mode) of the same technology operating at 2 different chip rates
  - Make the Sub-Rate version of HSDPA the basic rate for 1xEV-DV, while keeping as an option the compatibility of cdma2000 with the full rate HSDPA.