

## **Implementation of IMT-2000**

Technology Options and Economic Consequences of  
Migrating Existing Systems

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## **Content**

- **Why Migrate Systems?**
- **Migration Paths**
- **Current Trends in Migration**
- **Role of Government**

## Why Migrate Systems?

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### Migration – Reasons from Government's Perspective

- Encourages efficient use of the spectrum
- Gives operators maximum business flexibility
- Allowing such flexibility attracts investment
- Positions industry to respond to change in the market both from demand and supply side
- Public interest

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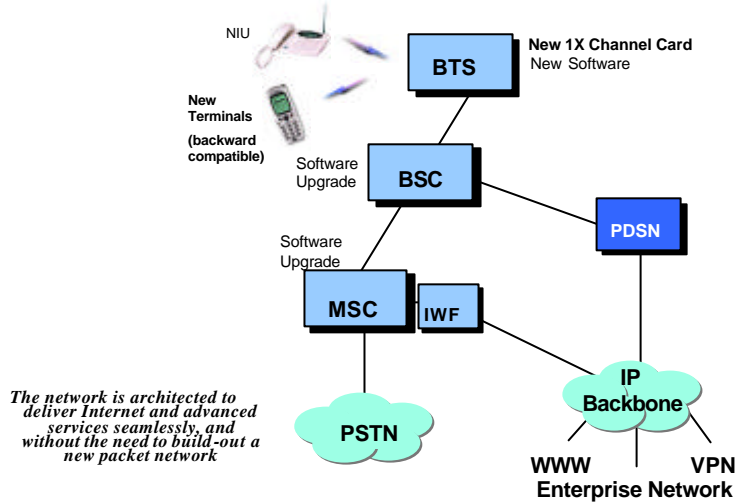
## **Migration – Reasons from Operator’s Perspective**

- Take advantage of existing capital expenditures and reduce further capital costs
- Reduce licensing costs (e.g., need for additional spectrum)
- Increase voice capacity
- Increase growth opportunities (e.g., provision of new services - data services, location-based applications)

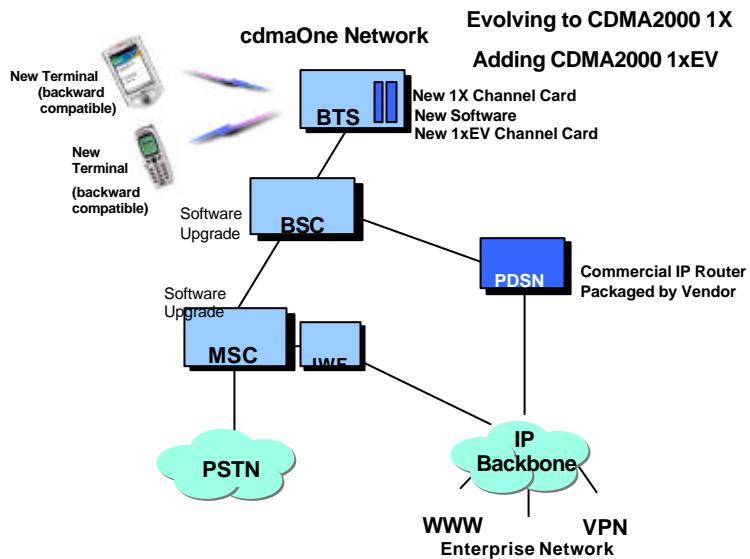
## **Migration Paths**

### cdmaOne to CDMA2000 1X

Requires minimal and incremental modifications to existing system

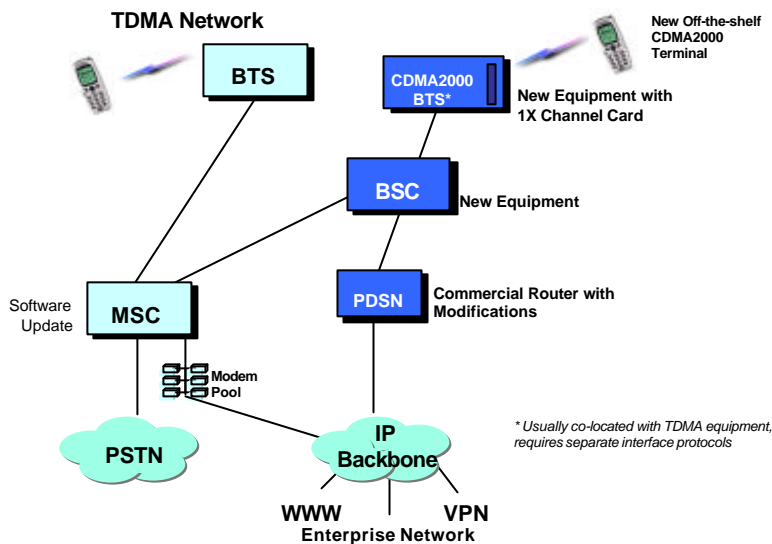


### CDMA2000 1X to CDMA2000 1xEV-DO easy network upgrade...

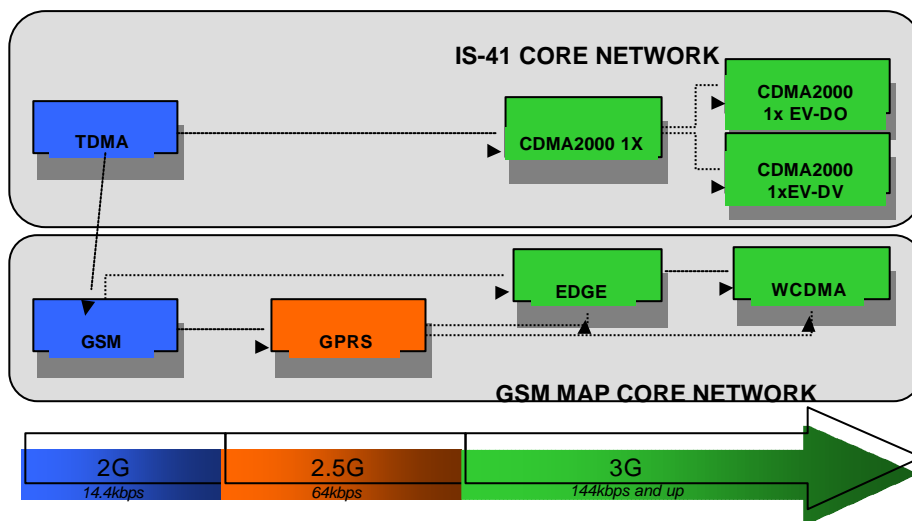


**From TDMA to CDMA2000: preserving investments in the existing core network** *September 2003*

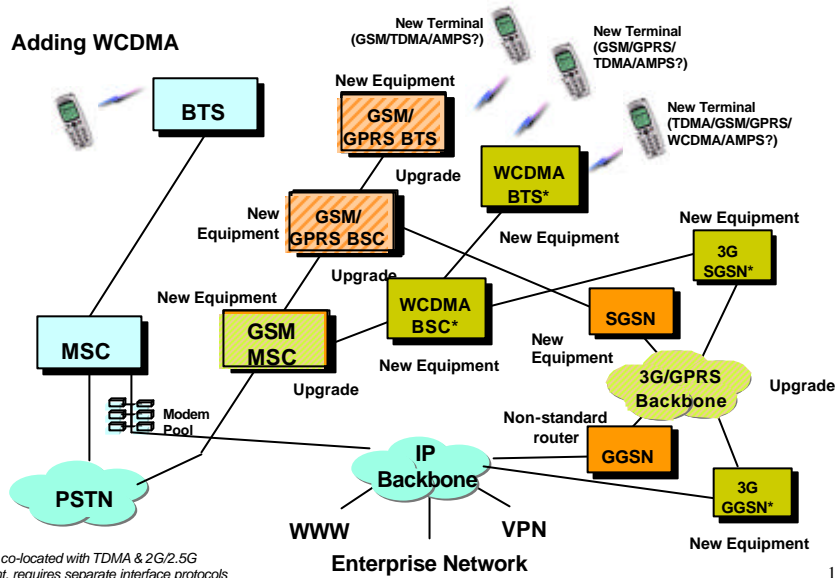
**TDMA to CDMA2000 1X**



**From TDMA to GSM/GPRS to EDGE to WCDMA**



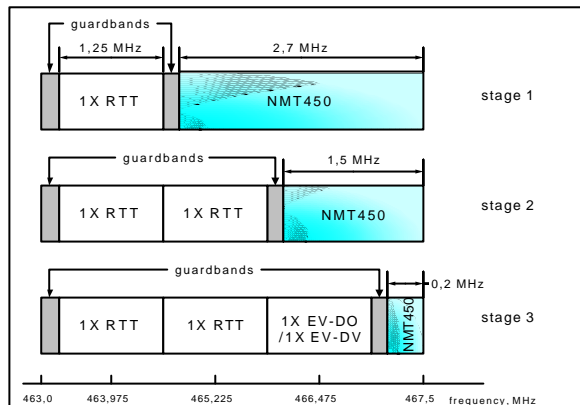
Migration from TDMA to GSM/GPRS and WCDMA requires a complete network overhaul



**From NMT to CDMA2000**

- ✓ **Smooth migration to digital technology in the 450 MHz band may be performed in several stages.**
- ✓ **Stage 1 - initial deployment:** Introduction of a single CDMA2000 1X carrier and guardbands. NMT network remains operational in parallel with the new CDMA2000 system.
- ✓ **Stage 2 - network growth:** Introduction of a second CDMA2000 1X carrier. NMT service operational with limited quality due to reduced bandwidth available.
- ✓ **Stage 3 – high demand for data services:** Introduction of a data-optimized carrier (1xEV-DO or 1xEV-DV) to meet users' data needs.

## From NMT to CDMA2000



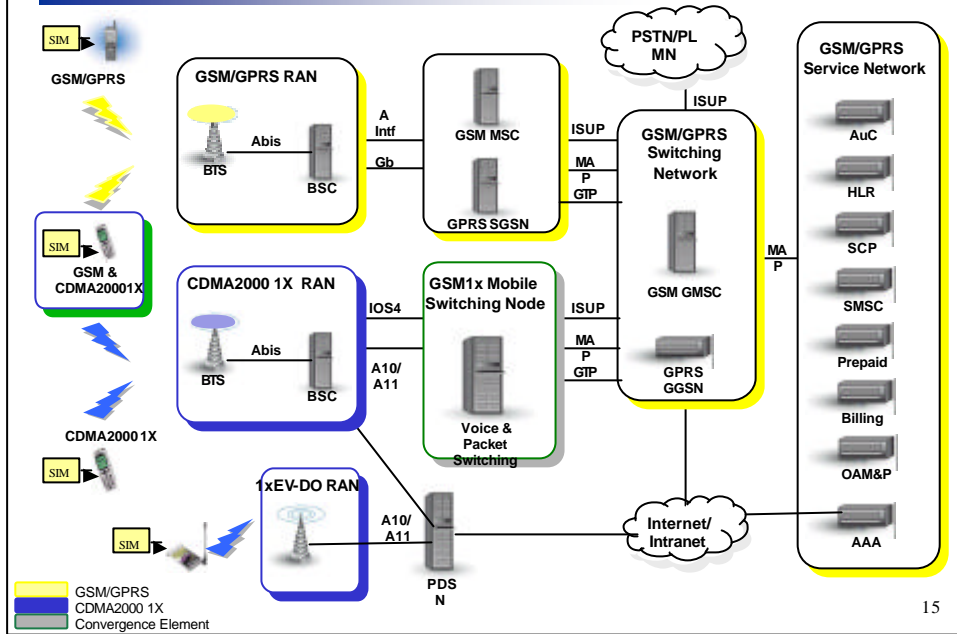
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## Options are Growing for GSM Operators


- ✓ **GSM with a GPRS overlay for data services**
- ✓ **Migrate GSM/GPRS to EDGE**
- ✓ **GSM/GPRS with a CDMA2000 1xEV-DO overlay in existing spectrum**
- ✓ **Obtain new spectrum and deploy WCDMA**
- ✓ **Migrate GSM/GPRS using a GSM1X overlay in existing spectrum**

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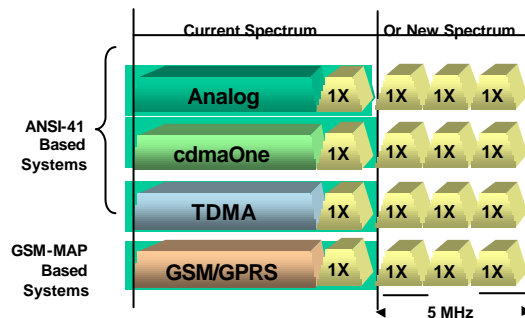
### From GSM to GSM 1X



### Attraction of CDMA2000 as a Migration Option

 CDMA2000 was designed with a philosophy of spectrum independence, enabling existing systems to migrate to 3G using 1.25 MHz radio frequency channels.

- CDMA2000 can operate in various bands:**
- 450 MHz
  - 700 MHz
  - 800 MHz
  - 900 MHz
  - 1700 MHz
  - 1800 MHz
  - 1900 MHz
  - 2100 MHz





## Attraction of CDMA2000 as a Migration Option



### Migration to CDMA2000 can be incremental

- Operators of TDMA, GSM, and NMT systems can use CDMA2000 1X and 1x-EV-DO solutions today to address specific demands in specific markets:
  - Increase voice capacity where company faces spectrum constraints (e.g., introducing two CDMA2000 1X carrier channels can increase TDMA voice capacity by at least 50%)
  - Provide high speed data services where specific demand is high from business and commercial residents (e.g., up to 2.4 Mbps for CDMA2000 1xEV-DO)
  - Provide robust connectivity to underserved areas

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## Attraction of CDMA2000 as a Migration Option



### CDMA2000 handsets are readily available and relatively inexpensive

- Over 400 handset, terminals, PDA, modems available models
- Offer color displays, MP3 players and photo cameras, support high-speed data access
- CDMA2000 devices are backwards compatible with cdmaOne devices
- CDMA2000 1X devices have a long battery life (250 hours)

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## Attraction of CDMA2000 as a Migration Option

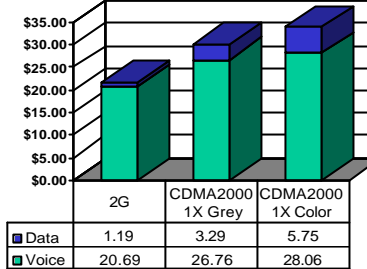


**CDMA2000 is delivering value to consumer and increased revenue to operators**

### Applications

- Multimedia messaging
- Game downloads
- Telematics
- Camera and motion video

### Revenue per Subscriber (ARPU)



*CDMA2000 delivers nearly 5 times an increase in data revenue and more than 50% higher total revenue per subscriber*

Source: Morgan Stanley, June 2002

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## Reasons for CDMA2000 Success



**Requires relatively small capital investments**

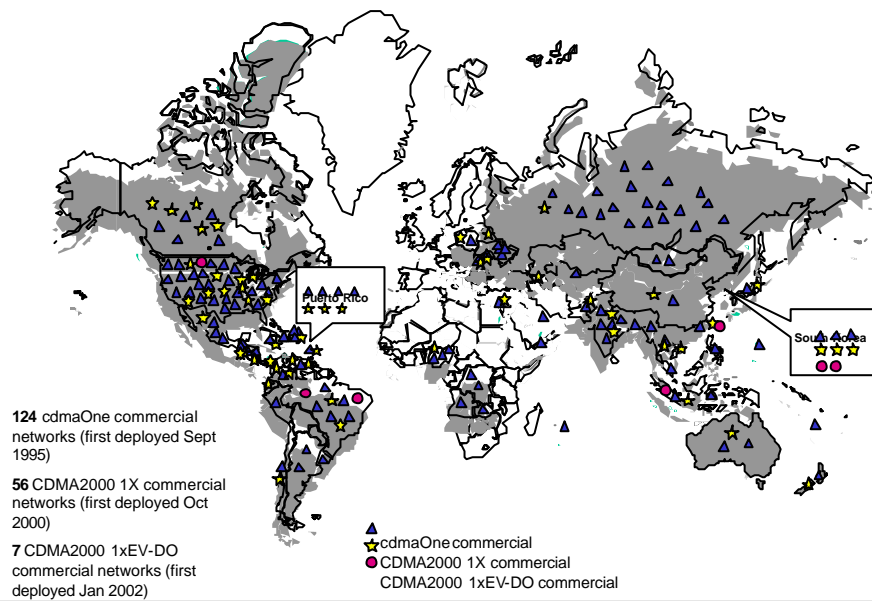
	Total Capex (US\$ billion)
KTF (CDMA2000 1X and 1xEV-DO)	1.2
Sprint PCS (CDMA2000 1X)	1.6
LGT (CDMA2000 1X)	0.4
KDDI (CDMA2000 1xEV-DO)	2.4
DoCoMo (W-CDMA)	10.9
AT&T Wireless (GSM/GPRS/EDGE/WCDMA)	4.4

Source: Morgan Stanley, June 2002

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## Current Trends in Migration to CDMA2000

## CDMA Deployment Around the World



## **Role of Government in Addressing IMT-2000 Implementation, Evolution and Migration**

- Permit flexible use of the radio spectrum
  - Limit segmentation of the wireless market (e.g., assigning bands on specific service basis)
  - Limit obstacles for operators to enhance existing networks or portions of their network
- Adopt technology neutral approach (e.g., licensing such as service rules, terms and conditions of licenses and development of universal service policies)
- Keep current with technological developments
- Maintain dialogue with operators, vendors, and consumers

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## **Thank You**

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