



Building the Mobile Tomorrow

Kevin Kahn

*Intel Senior Fellow
Director, Communications Technology Lab*

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Intel Developer
FORUM

The Future of Mobility

Access to
ANYTHING
You want...



Delivered to you
EASILY...



WHEN
You want it...



RELIABLY...



WHERE
You want it



And **SECURELY**



Delivering the Future of Mobility



Ethnographic Research



Improving mobile devices



Improving networks



Leading Standards and Spectrum policy

Delivering the Future of Mobility



Ethnographic Research

Examples:

- **Understand people and the use of technology**
- **Apply learnings to develop more useful technology**

Improving mobile
devices

Improving networks

Leading Standards
and Spectrum policy

Delivering the Future of Mobility

Examples:

- Energy efficient platforms
- CMOS radio
- Antenna research
- Low-power radios
- MIMO



Improving mobile
devices

Improving networks

Leading Standards
and Spectrum policy

Delivering the Future of Mobility

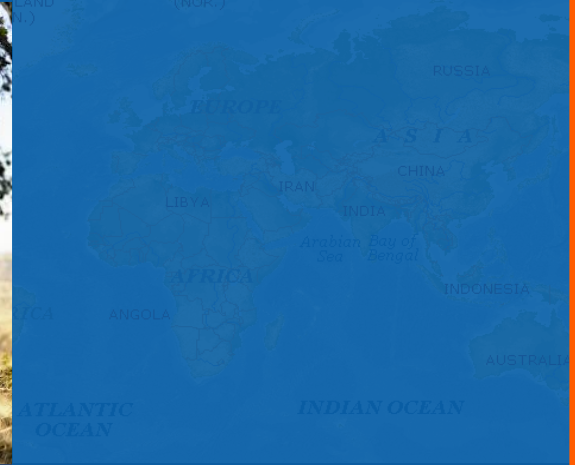
Examples:

- Increased range
- Increased bandwidth
- Seamless access
- Easy roaming
- More secure

Ethnographic Research



Improving networks



Leading Standards
and Spectrum policy

Delivering the Future of Mobility ...

Ethnographic Research

Examples:

- 802.16e
- 802.11n
- 802.21
- Wireless USB

Improving mobile
devices

Improving networks

Leading Standards
and Spectrum policy

Today's focus

- Seamless Access
- CMOS Radios
- “Slicing By Eight”

Ethnographic Research



Improving mobile devices



Improving networks



Leading Standards and Spectrum policy

Addressing Network Bottlenecks

- **Objective:**

- Ensuring data integrity in network transfers

- **Current solution:** Cyclic Redundancy Codes (CRC)

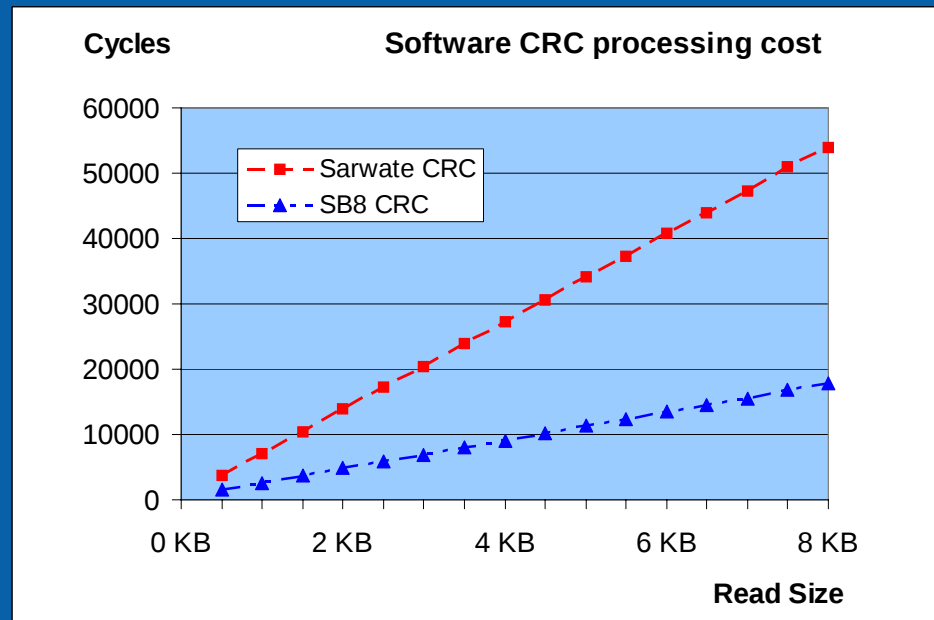
- Significantly reduce impact of data errors by detecting them efficiently
 - CRC calculated for some amount of data and verified by receiver
 - CRC Generation typically consumes too many CPU cycles, slowing down performance
 - Sarwate is most commonly used algorithm

- **Problem:** CRCs are a significant bottleneck

- Example: iSCSI performance

Introducing: “Slicing By Eight” Algorithm (SB8)

- **SB8 provides up to 3x CRC performance gain**
 - Novel, Fast, Easy algorithm for CRC generation
 - Optimized for 64-bit operations (vs. 8-bit for Sarwate)
 - Scalable: Scales with frequency and processor core count
 - Reduces iSCSI protocol overhead and improves performance
- **Frees up CPU resources**
 - 2.2 cycles/byte vs. 7 for Sarwate



SB8 Available Now

- SB8 is available starting today for download and implementation
 - Source Code available today at URL below
 - Free of charge

<http://sourceforge.net>

- More details available at IDF in course, chalk-talk and demo showcase

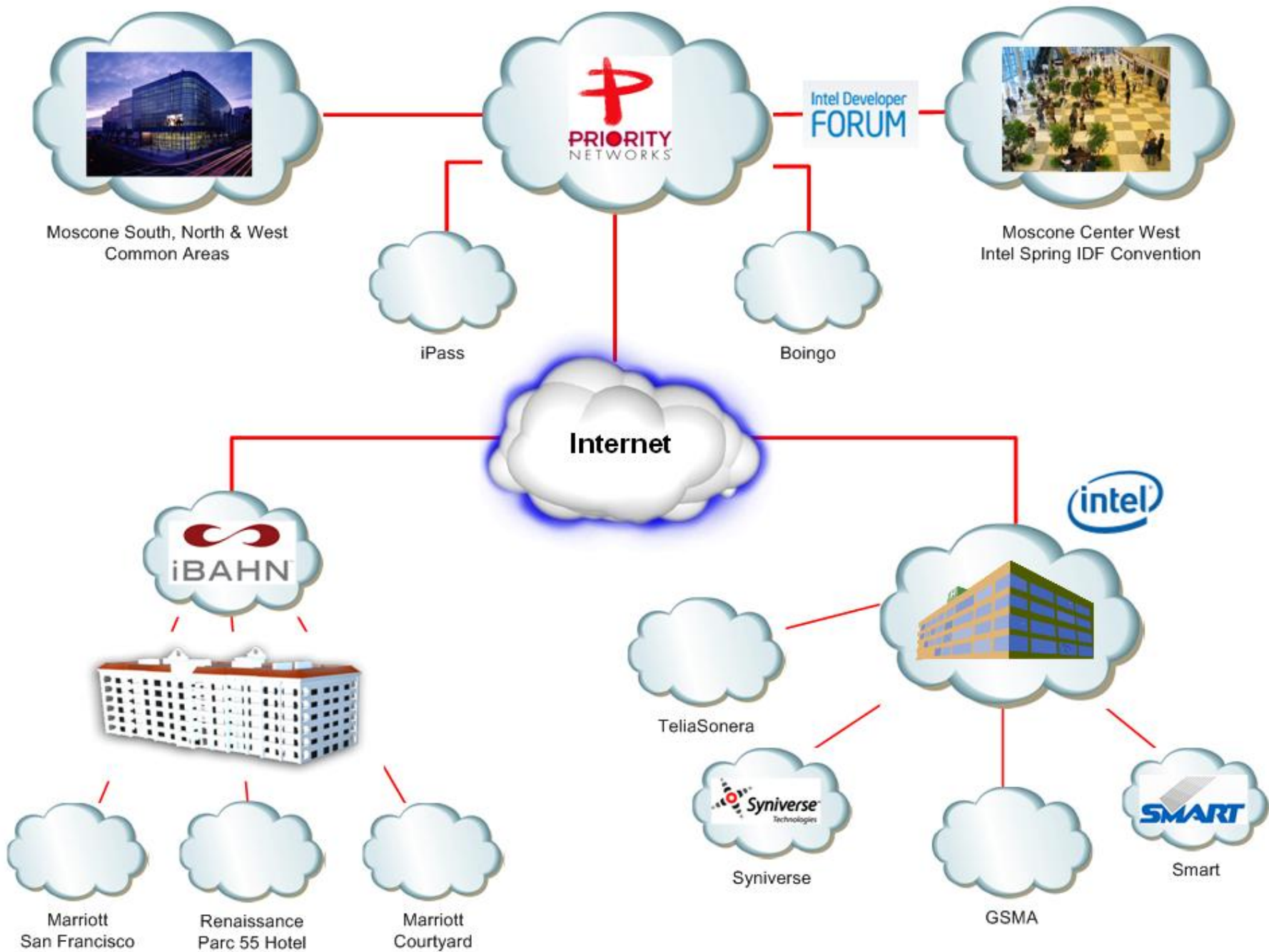
Seamless Access

Background

- Standards-based set of interfaces to facilitate global roaming and interoperability
- Architected for end-to-end solution across networks
 - Spans multiple standards, industry groups and business models
 - Validated with real implementation
- Benefits both service provider and customer
 - Safer and simpler login
 - Seamless consumer experience
 - Better customer identification
 - Enables advanced IP services
 - Single interface for multiple roaming partners

Announcing: Seamless Access Deployment

- First instance of heterogeneous network roaming
 - Supports WiFi and 3G SIM authentication
- Culmination of over 5 years development, trials and industry enabling
- Commercial roll-outs have begun worldwide
 - Roll-outs now in Singapore, Stockholm, Geneva, London and more coming in 2006
- Today's system prototypes tomorrow's WiMAX roaming



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The Radio Evolution

Today

Tomorrow

Future



Discrete Radios

One standard
Bulky, costly
Inflexible

Integrated Radios

Full CMOS Integration
Multi-standard
+Performance, -Cost, -TTM

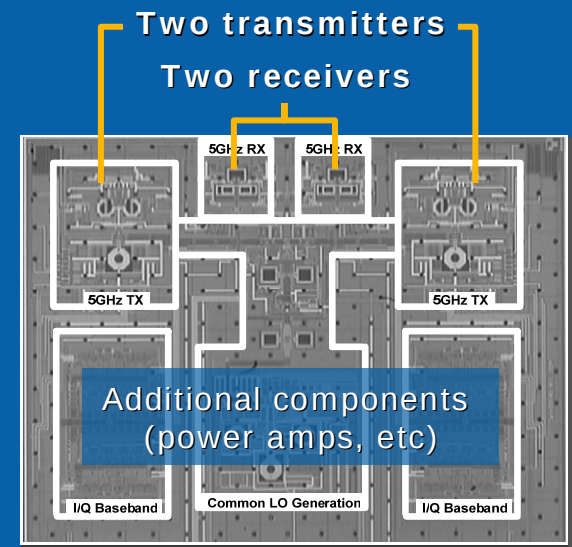
Cognitive Radios

Reconfigurable CMOS Radios
Multiple antenna systems
Spectrum Reuse

Wireless Platform Communication

CMOS MIMO Transceiver Research

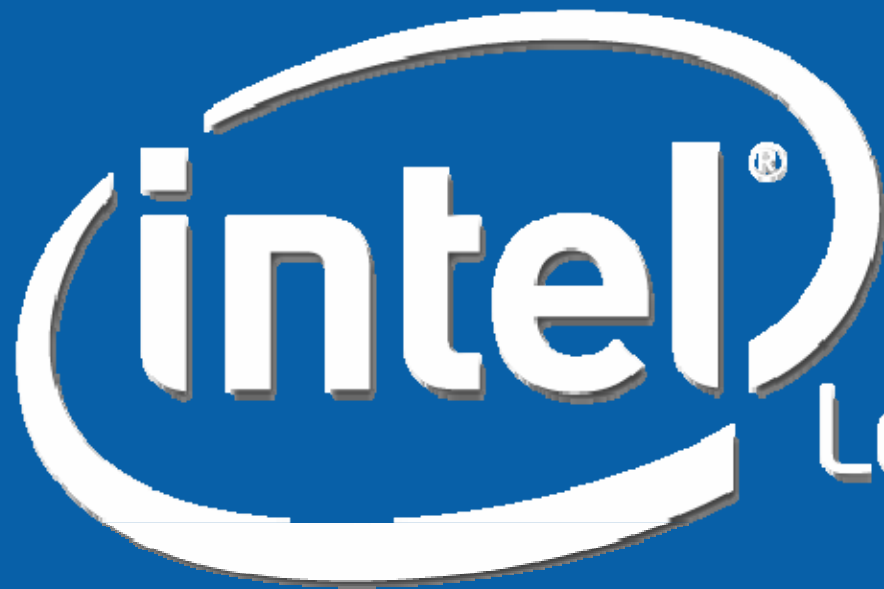
- MIMO: Multiple Input, Multiple Output
- Uses multiple antennas at the source and destination to improve performance
- Intel has built an 2x2 MIMO wireless research chip:
 - 2x data rate ($>100\text{Mb}$) using *no additional spectrum*
 - Uses Intel's 90nm CMOS process
- Integrated CMOS wireless chips could:
 - Reduce costs
 - Increase performance
 - Reduce the size



MIMO Research Chip Photo

Summary

- Intel is enabling the future mobile lifestyle
- “Slicing By Eight” improves performance
 - Available today
- Seamless Access rolling out commercially
 - Try it at IDF
- Continuing advances in wireless platform communication
 - CMOS MIMO transceivers



Leap ahead™

Related Sessions and Demos

- Slicing by Eight – High Octane CRC Generation – Michael Kounavis
 - Session: Thursday, March 9, 1:30 – 2:20, Room 2000
 - Chalk Talk: Thursday, March 9, 2:30 – 3:20, Room 2001B
 - Demo: Technology Showcase, Booth 1007
- Deploying 802.1X WLANs for Roaming Now – Dan Dahle and Vu Nguyen
 - Session: Tuesday, March 7, 3:00 – 3:50, Room 2000
 - Demo: Technology Showcase, Booth 831