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| Project | **IEEE 802.20 Working Group on Mobile Broadband Wireless Access** <http://grouper.ieee.org/groups/802/20/> | |
| Title | **Handoff for 802.20** | |
| Date Submitted | **2003-11-05** | |
| Source(s) | Jim Tomcik<br>QUALCOMM, Incorporated<br>5775 Morehouse Drive<br>San Diego, CA, 92121 | Voice: +1 858 658 3231<br>Fax: +1 858 658 2113<br>Email: jtomcik@qualcomm.com |
| Re: | MBWA Call for Contributions | |
| Abstract | This contribution discusses the need for 802.20 MAC Level and System Level Handoff. During a recent review of the requirements document draft it was noted that these areas had been removed for lack of text. This talk provides further justification of the needs for Handoff Mechanisms, both 802.20 to 802.20 and also for interworking with existing systems. | |
| Purpose | This contribution is provided as inputs to the 802.20 Working Group, for inclusion of the handoff features in 802.20 specifications. Requested to Review and Accept this proposal. | |
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# Handoff for 802.20

Jim Tomcik

jtomcik@qualcomm.com

# Handoff History in 802.20 Requirements

- Initial Strawman Requirements Proposal Included a Handoff Section
- Section Scope Intentions
  - 802.20 to 802.20 Handoff
  - 802.20 to Other Technologies
    - Cdma2000, 1xEV-DO, WCDMA
- Suggested Texts Contributed 23 October in the “Last Call” for new material
- Text Intended to be Simple and High Level
  - Doesn’t anticipate implementation
  - Calls for MAC Level Handoff Mechanisms

# Handoff Text - 1

- Proposed Text:
  - *4.4.2 MAC Layer Handoff*

    *The Air Interface shall include handoff support below the IP layer. Handoff mechanisms defined shall insure the uninterrupted flow of data to and from the Mobile Station at rates up to 6 <typo – should be 60) handoffs per minute.*

- Rationale:

  To support high speed mobility, handoff support below the IP layer is essential to an efficiently operating air interface. For example, at 250 km/hr, assuming 1km cell radius as a nominal size, a mobile station could be in handoff processing to accomplish many handoffs per minute. This handoff rate will be difficult to support well at the IP layer, given IP network delays, and the messaging overhead of current network layer mobility solutions.

# Why Handoffs Requirements? Why in the MAC?

- Handoff is an Integral Part of a Mobility Technology
  - Maintenance of Network Connectivity
  - Vehicle Paths can Vary Attachment Points Quickly
- Handoff is a Tool for a Licensed Operator to Manage the Network
  - Handoff Aids in Load Sharing/Balancing
  - Handoff Can Aid in Providing Defined Levels of Services Where Available
- Why MAC Layered Handoffs??
  - Performance, Performance, Performance!!!
  - Provides Operator Control if Behaviors are Specified
    - Specification of HO Avoids Uncertainty About Compliant Behaviors
  - 802.20 Specifies up to MAC (and Management) Interfaces
- Handoff Mechanisms are Considered in Elsewhere in 802 Also
  - ECSG
    - Realization that Improved Handoff Performance is Needed
    - Realization that it Has to Be in MAC
  - 802.11 – Fast Roaming and Handoff – 802.11 to 802.11
  - 802.16e – Handoff Support In MAC Messaging

# Handoff – 2 (802.20 to Other Technologies)

- Proposed Text in Requirements
  - *The Air Interface shall include handoff support with 3G systems <below the IP layer>. Handoff mechanisms defined shall insure the uninterrupted flow of data to and from the Mobile Station at rates up to 2 handoffs per minute. 802.20 Mobile Stations and Base Stations shall support at minimum:*
    a. *Handoff with cdma2000 1x systems*
    b. *Handoff with WCDMA systems*
    c. *Handoff with cdma 1xEV-DO (rev "0" and rev A) systems*
    d. *Handoff with GSM/GPRS Systems*
    e. *Handoff with EDGE Systems*
  - Rationale:

    To support 3G service continuity and interworking with other deployed systems, handoff support is essential to an efficiently operating 802.20 system. Since many emerging services are IP-based handoff support is advocated for these. Because of the high-speed aspects of the 802.20 air interface, and the latencies involved with network level handoff, mechanisms incorporated below the network layer are essential to service continuity. For example, several handoffs per minute between a 3G system and an 802.20 system may be required.

# Why Interworking/Handoff?

- 3G Services are Being Deployed Currently
  - Many New and Popular Services Available to Users
  - Operators (and their customers) Will Want Service Continuity
  - Desirable to Re-Use Existing Infrastructure Supporting Service Delivery
- Convergence of Networks Requires Ubiquitous Service Availablity
  - When 802.20 Becomes Deployed Convergence Will be Well Under Way
- It is Very Important for 802.20 to Include This Support from the Start
  - Helps to Satisfy Anticipated Applications
  - Avoids Add-On Approach to Interworking

# Summary and Next Steps

- 802.20 to 802.20 Handoff
  - Important for Full Mobility
  - High-Performance Handoff Requires Mechanisms in MAC
  - Operator Control Implies Handoff Within 802.20 Scope
- 802.20 to Other Technologies
  - Service Continuity is Important to Deliver New Services
  - Currently “New” Services Will be Existing and Popular Services When 802.20 Gets Deployed
  - Compatibility and Interworking Will Be Important
- Should We Re-Open These Topics?