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Agenda Item: **Ad-hoc 8 : Handover**

Source: **Golden Bridge Technology**

Title: Hard Handover with fast power control

Document for: **Decision**

Abstract

The order of diversity in W-CDMA is higher than N-CDMA. So, the gain of soft handover over hard handover will not be as much in W-CDMA as compared to N-CDMA.

Hard handover shall be used for intra-frequency as well as inter-frequency handoff for various services. The hard handover scheme will reduce the complexity of the infrastructure as well as that of the mobile station. The fast search capability and fast neighbor detection is key to favorable performance in these schemes. Compressing the data and increasing the data rate within a frame or two facilitates lossless handover.

During the mutual power control of the Base Node and UE, the TPC rate will be at higher rate and the method of TPC symbol transmission could be differential encoding so that there is no need for Pilot bits.

Hard Handover Physical Layer Procedures

1. Mobile Station (MS) monitors all Base Stations (BS) in neighbor list.

2. MS sends RSSI measurements to its controlling BS.

3. Controlling base station decides to handoff (procedure based).

4. Controlling base station notifies MS and target base station.

5. The target BS notifies both the controlling BS and the MS of the scrambling code and channelization code for the mobile station.

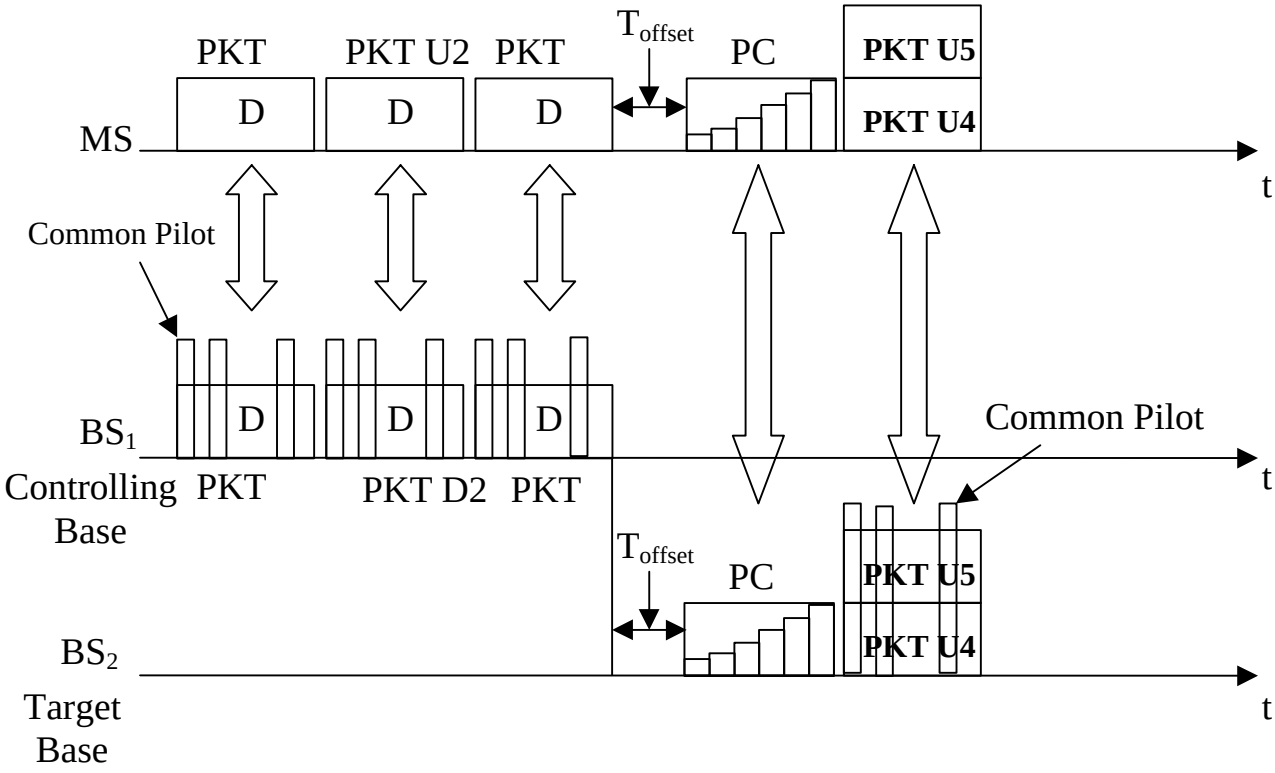
6. The controlling base station notifies the MS, target BS and the switch of the time of handoff.
7. At the pre-determined time, the MS starts transmitting the frame, which has PC bits at higher rate (TBD), as well as rate information indicating the rate of the next data frame. The rate information is negotiated before the break. The MS ramps up the power from the beginning of the frame.

8. At a pre-determined time, the target BS starts transmitting the PC/RI frame to the MS at the initial open loop power level. The power will be ramped up in a stepwise fashion. The PC bits will be +1 while there is no response from the other side.

9. The MS and the target BS send a single PC frame, compress the next data frame and begin transmitting the data frames subsequent to the PC frame.

10. Subsequent frames are not compressed.

See **Figure 1:** Hard Handover Physical Layer Procedure.



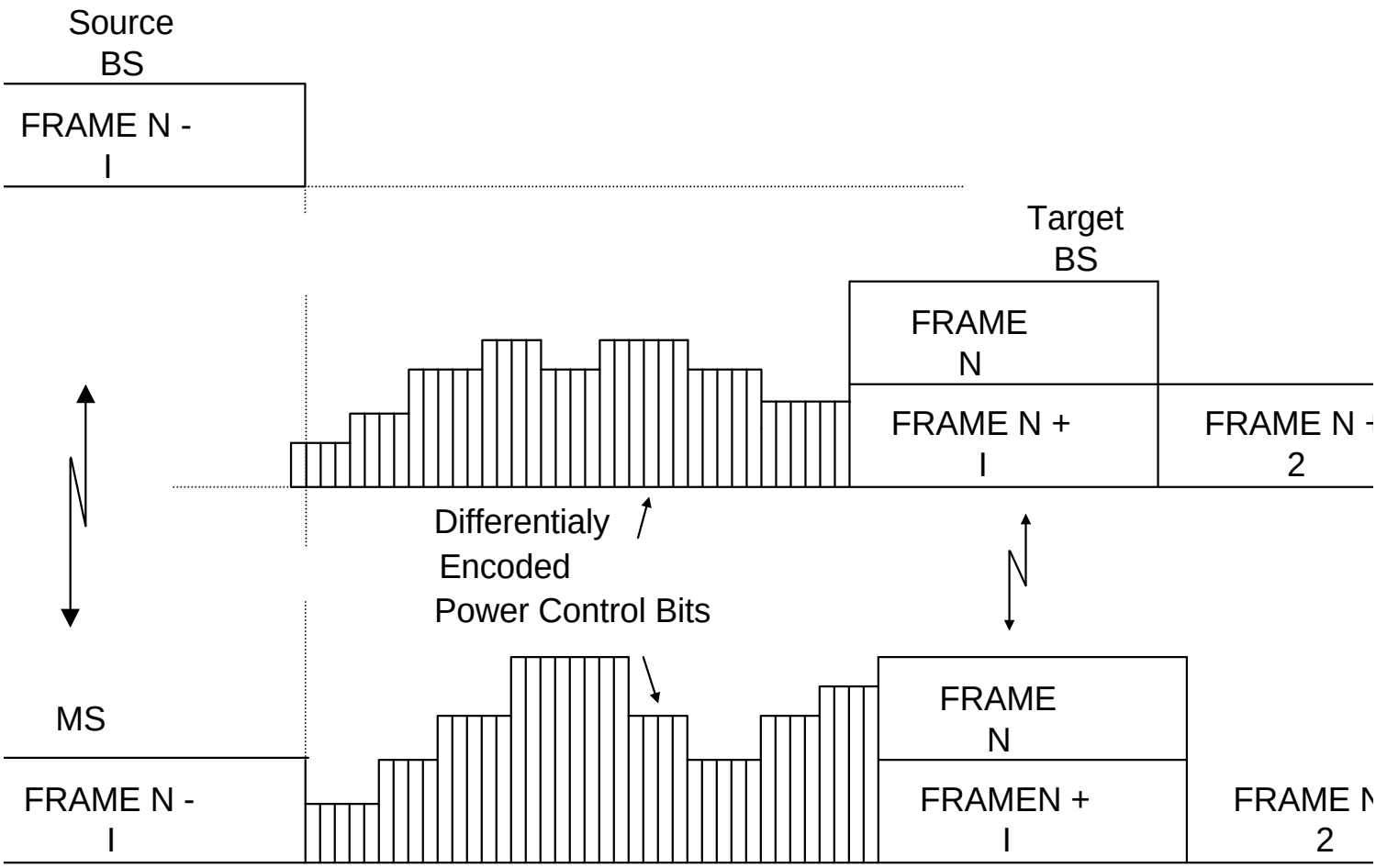
T_{offset} = Time Offset Between BS_1 and BS_2
UL and DL Frames are Assumed to be Time-aligned

Figure 1: Hard Handover Physical Layer Procedure

Figure 2 in the next page shows how the process of Base Node-UE mutual power control is achieved prior to transmission of the data to the target base station. In this figure, we show one of the means of transmitting the power control bits and that is by differentially encoding the bits. Another method is by modifying the DPCCH channel so that higher rate TPC commands are transmitted. So, the further specification issues are:

1. Differential encoding of the TPC bits for differential coherent detection or using the current DPCCH structure with higher rate TPC commands.
2. The TPC rate during mutual power control.

The key issue in this contribution is adoption of the hard handover methodology and the principle of quick mutual power control to enable an efficient lossless hard handover.



G 2. Timing Diagram of Handoff Process Using Code Multiplexing