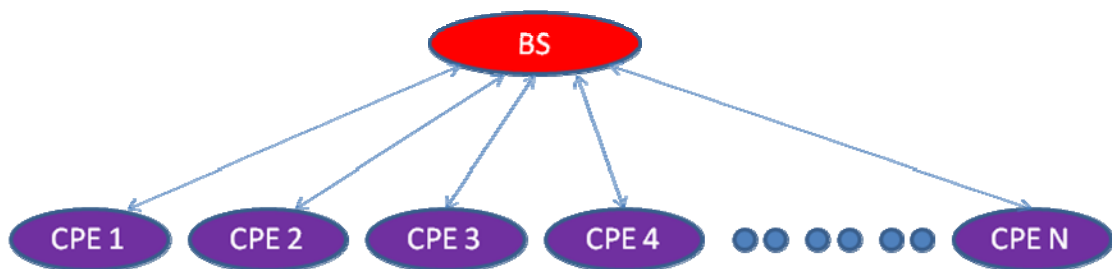


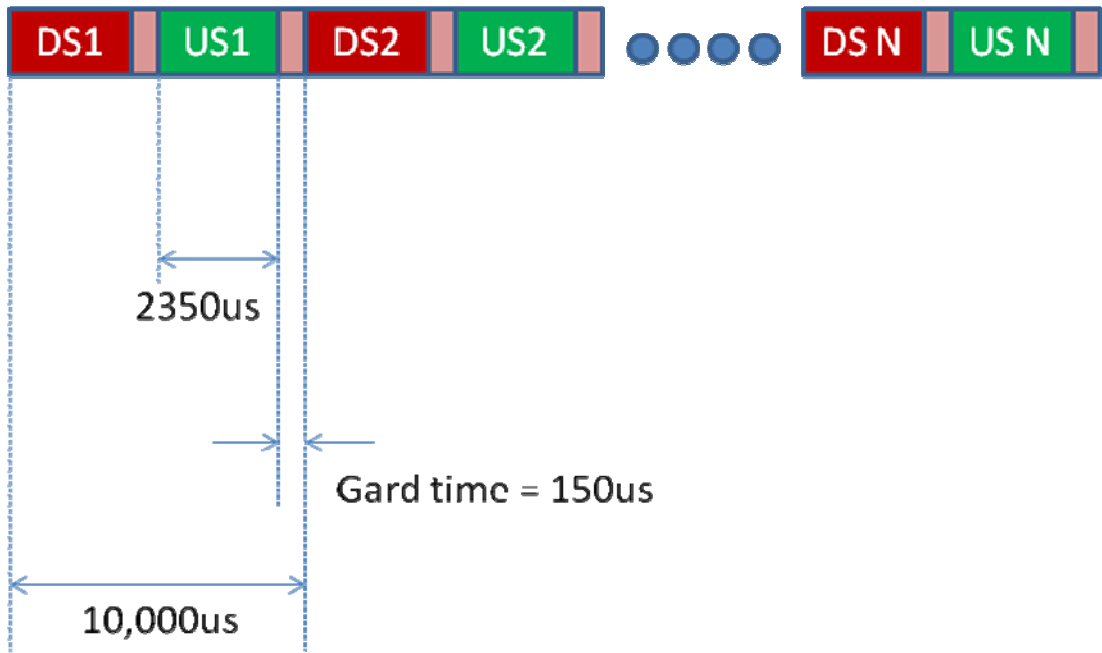
WHITE PAPER – WiTDM[®] vs. 802.11

WiTDM[®] is one kind of TDMA technology, and a transmission protocol suitable for outdoor equipments with Point to Point and Point to Multi-Point transmission in long distance. Being different from 802.11 CSMA/CA, the maximum transmission efficiency of WiTDM[®] can be up to 150% of CSMA/CA 802.11. In the outdoor environment, WiTDM[®] won't have the problem of hidden node which comes up to 802.11 often, and overall network band won't be seriously reduced because of the hidden node. In 802.11 network, a remote transmission device with bad transmitting quality will be influenced seriously, while WiTDM[®] won't have this kind of NEAR-FAR problem.

A. Network Structure :



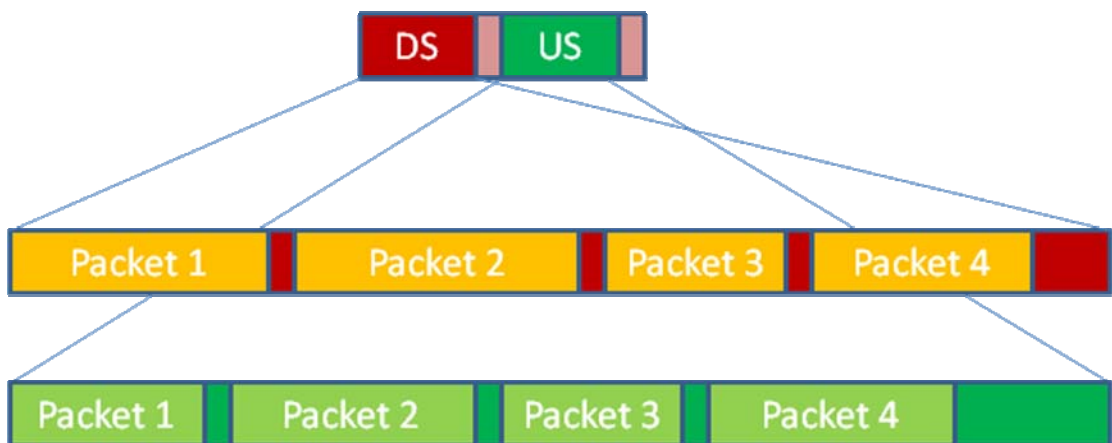
It includes Up Stream (US) and Down Stream (DS) for each connection between Base Station (BS) and CPE. Be separated to many Time Slots, and its unit is 10ms. Every time slot includes Up Stream, Down Stream and Gard Tim. It will guarantee no collision occurs around 40Km connection because of the time delay.



B. Transmission Efficiency:

WiTDM[®] uses the way of bursting in each Time Slot, the interval between packets is only 9-10us, no more Random Backoff such as 802.11, it will be more effective than Wi-Fi. In 802.11, the interval between packets is 200~300us. Although there is no ACK in WiTDM[®], but it has ARQ mechanism. If the destination gets LOSS PACET, the source will re-send the PACKET. The information of ARQ is included inside the DATA PACKET, that is, the ARQ will not occupy much bandwidth.

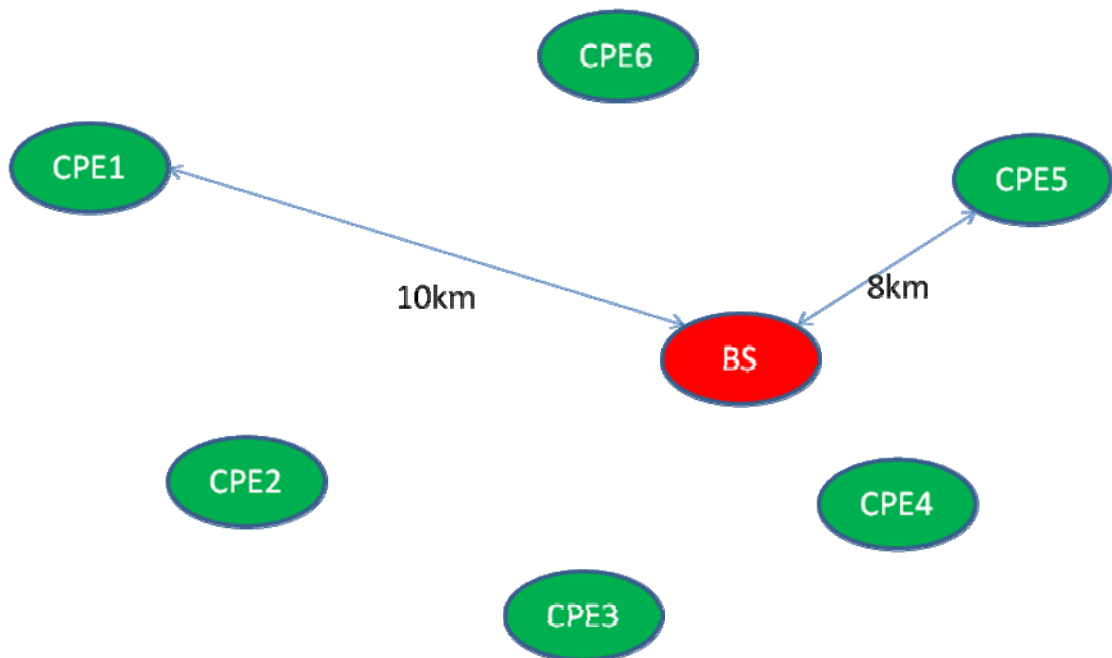
WiTDM[®] supports AUTO RATE CONTROL for different distance connection and status of environment; it will decide the best modulation of OFDM to send the data. In field test, the performance of WiTDM[®] is over 50% than 802.11.



C Problem of Hidden Node:

In 802.11 based on CSMA/CA mechanism, it will detect the environment whether any devices send data or not. If yes, it will do Random Backoff first, then try to send data. This way could prevent the collision. But CPE usually uses directional antenna to face the Base Station in the outdoors. In long distance connection, it is hard to detect data transmission between CPEs as showed below. When CPE1 is sending data, CPE5 can't find the transmission at all. In this time, if CPE5 prepares to send data, it will regard the environment as clear, and then send data to BS, after that, it will collapse with data from CPE1 in BS side. Because of ineffective data for BS, CPE1 and CPE5 must resend the data. According to experience, when containing more than 8 wireless devices in a wireless network, it will reduce 50% performance because of Hidden Node.

For WiTDM[®], the delivery time is scheduled for each CPE, it will not occur the situation of 2 CPEs sending data in the same time. Thus, no Hidden Node problem happens in WiTDM[®] network, and the use of the network resource will be more complete.





D Problem of Near-Far:

802.11, based on CSMA/CA, it means all devices will compete network resource with each other. In theory, each device has the same opportunity. But environment situation of each device is different, the OFDM modulation will not be same. It means if sending the same size packet, it will use low speed modulation for far device, and the probability of resending data could be high so that more resource of network would be occupied. Finally, the transmission of far device will influence the near one very seriously.

In WiTDM[®], it will share the transmission time equally, so far device will not occupy other transmission time. Each device will get guarantee transmission time and avoid the NEAR-FAR problem.