

## IP MobileNet transmit timing

The IP MobileNet system utilizes TDMA to transmit voice packets and slotted Aloha for data transmission. Voice slots are 248 ms long and repeat at 992 ms intervals. Mobiles are allowed to use only one voice slot at a time. Data time slots are 62 ms long and the number of slots varies by the size of the data packet. Over the air data rate is 19.2 kbps on 25 KHz channels. In addition to payload data, CRC bits and FEC bits are added to all packets that are actually transmitted. The data is also interleaved for improved transmission reliability. IP MobileNet commissioned a study, done by an independent consultant, that predicted communications reliability for various channel loading scenarios. That study predicted the First Time Data Success Probability and Expected Delay Until Transmission Successful based on the number of voice time slots occupied. Average expected data payload was 57.4 bytes, requiring 94 ms of transmit time. It is possible, under unusual circumstances, for the mobile to upload large data files. These transmissions are not typical, because reliable communications cannot be supported if transmissions of this length are allowed. The worst-case mobile transmission time is limited to 389 ms. The limit of 389 ms is achieved by placing an MTU limit of 576 bytes on the associated PC using the system for communications. If a large amount of data were to be uploaded from the mobile computer, the data would be broken down into packets that would require 389 ms to transmit. After the full packet is received by the base station, the data is de-interleaved, CRC and FEC codes are removed and the data is sent over an RS 232 serial link at 115.2 kbps to an IPNC (internet protocol network controller) for routing to the server application. After the server application receives the data, it will send an acknowledgement back to the IPNC confirming that the data was received properly. The IPNC routes the acknowledgement back to the base station over the RS 232 link. When the base station receives the acknowledgement, it will be placed in cue for transmission in the next available time slot. Acknowledgements require 1 data time slot to transmit. The turn around time required from receiving a packet to the completion of the acknowledgement transmission is 5 data time slots or 310 ms. After the acknowledgement is received, the next packet can be uploaded. Therefore the worst case duty cycle of the mobile is 389 ms on and 310 ms off, or transmission 53.4% of the time.