APPENDIX C

C.4.4 Network access delay.
NAD is defined as the time a station with a message to send shall wait to send a frame after the TP timer has expired. NAD discipline is based on an infinite sequence of "slots" that begin when the TP timer has expired. Slots are defined to be long enough so that all stations on the network will detect a station transmitting at the beginning of a slot prior to the beginning of the next slot. The duration of the NAD shall take the ~~each slot is~~ Net_Busy_Detect_Time into account as specified by the equation at the end of this paragraph. All transmissions, except the coupled acknowledgments, shall begin at the start of the next NAD slot.

There are five schemes for calculating NAD. The five schemes are defined below. Two of the access schemes, DAP-NAD and R-NAD, shall be available to all network participants using Synchronous Mode. Four schemes (R-NAD, P-NAD, H-NAD and DAP-NAD) compute a value F for each station on the net. The F value is the number of NAD slots that each station will wait before transmitting, if it has any information to send.

The random network access delay (R-NAD) scheme provides all stations with an equal chance to access the network. The prioritized network access delay (P-NAD) scheme ensures the highest precedence station with the highest priority message will access the network first. In the case of RE-NAD, network access delay is computed by the radio. With RE-NAD the DTE (DMTD or C^4I system) does not compute network access delay but does schedule channel access opportunities at which an access attempt can be initiated by the DTE. DAP-NAD, like P-NAD, ensures the highest priority message will access the network first. It does not ensure first access by highest precedence station however. The hybrid network access delay (H-NAD) scheme combines random access with the preferential access by frame priority. The random and hybrid schemes might result in a collision (the same NAD value for two stations). The P-NAD and DAP-NAD schemes always produce a unique NAD value for each station. In all of the NAD schemes, if the TP timer is active, the stations with frames to transmit shall wait for the TP timer to expire before the NAD is started. If the TP timer is not active, the station shall calculate its NAD using the proper NAD scheme for the network. Each NAD scheme produces a set of allowed access periods. The network may be accessed only at the beginning of one of those periods. If a station using P-NAD, DAP-NAD or H-NAD is waiting for its NAD time and a higher priority frame becomes available for transmission, the station may shorten its NAD time to a time it would have computed if it had computed its original NAD time using the new, higher frame priority. Below are the frame reception and transmission procedures:

a. Upon receipt of a ~~A station shall analyze a received~~ frame, ~~to determine if~~ a TP delay timer shall be ~~set~~started. The transmission of additional frames shall be suspended until expiration of the TP delay timer. (All pending frames shall await expiration of the TP delay timer). After the frame check sequence has been verified, the address and control fields are analyzed. If the received frame is either a UI or TEST frame and the poll bit is set to 1, ~~then a~~ the TP timer allows for

receipt of the requested coupled acknowledgments. ~~is set.~~ For receptions other than the UI or TEST with poll bit set, the TP timer provides sufficient delay to allow all systems to compete equally for access. ~~Any other pending frames for transmission shall be placed on hold. If the received frame was not a UI or TEST frame with the poll bit set, a NAD value shall be computed and initiated after the TP timer expires. An R-NAD or H-NAD value shall be calculated and initiated if the network busy status is clear. DAP-NAD values need to be recalculated after each transmission.~~Regardless of what was received, a NAD value shall be recomputed and initiated after the TP timer expires. The calculated value of NAD is rounded to the nearest millisecond.

b. If a station does not have a frame to transmit, it shall compute a NAD time using routine priority for its calculations. If the NAD time arrives before a frame becomes available to transmit or frame(s) are not yet encoded for transmission, the station shall compute and use a new NAD time. The starting time for the new NAD and the F value used in compting the new NAD shall be based on the NAD method as indicated in the following paragraph. ~~the same as the starting time for the NAD that was just completed. The F value used in computing the NAD shall be the sum of the F value used in the NAD just completed, plus a value dependent on the NAD in effect~~.

1) For P-NAD the new NAD time shall begin immediately following the NAD that just expired. The F ~~this~~ value shall be (NS + 1). This creates another group of NAD slots for all stations on the network. Adding this value at all stations preserves the algorithmic collision prevention property of P-NAD.
2) For R-NAD the new NAD time shall begin immediately following the NAD that just expired. The ~~this~~ F value shall be [(3/4) * NS + 1]. Adding the same constant value at all stations preserves the random property of R-NAD.
3) For H-NAD the new NAD time shall begin immediately following the NAD that just expired. The ~~this~~F value shall be 1 if the station has an urgent or priority frame to transmit and (Routine_MAX + 1 - Routine_MIN) if a station has only a routine frame(s) or no frame(s) to transmit. The value 1 preserves the intent of H-NAD that is to grant preferential network access to stations with urgent or priority frames to send. The value (Routine_MAX + 1 - Routine_MIN) preserves the random property of H-NAD for stations with only routine frames to send.
4) For RE-NAD, F is not used.
5) For DAP-NAD a series of NAD are calculated as per equation 1 in paragraph C.4.4.5.2. The start time for each NAD in the series *is* calculated relative to the end of the last transmission *that* was received. The F value for DAP-NAD shall be as specified in the reference equation,

i.e. NS. The referenced equation creates an infinite series of unique and accurate NAD times for each station on the network such that the ~~this value shall be (NS). This creates another group of NAD slots for all stations on the network. Adding this value at all stations preserves the~~ algorithmic collision prevention properties~~y~~ of DAP-NAD are maintained even when messages become available for transmission at the same time at different stations after a long idle period.

c. All stations on the network shall continue to sense the link for data or voice network busy and shall withhold transmission until the appropriate NAD period has expired. NAD shall be calculated using the formula:

NAD = F * Net_Busy_Detect_Time + MAX(0, F-1) * DTETURN

where Net_Busy_Detect_Time is as defined in C.4.1.3 and DTETURN is as defined in C.3.2.9.