Improved Class A Talker
Worst Case Latency Equation

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Current Equation

Equation: Max Latency = tDevice + tInterval + tMaxFrameSize + tStream - t(Stream+Gap)*1.333

(incl. Preamble, SFD, IPG) (incl. Preamble+SFD) (incl. Preamble, SFD, IPG)
Worst Case Latency = 197.36µs - tIPG + tDevice
= 197.36µs - 0.96µs + 5.12µs
= 201.52µs

Current Worst Case Latency Equation:
Worst Case Latency = tDevice + tInterval + tMaxFrameSize + tStream - t(Stream+Gap)*1.333
= 5.12µs + 125µs + 123.36µs + (24µs-0.96µs) - 24µs*1.333
= 244.52µs
Talker Worst Case Example 2

Worst Case Latency = 147.36µs - tIPG + tDevice
= 147.36µs - 0.96µs + 5.12µs
= 151.52µs

Current Worst Case Latency Equation:
Worst Case Latency = tDevice + tInterval + tMaxFrameSize + tStream - t(Stream+Gap)*1.333
= 5.12µs + 125µs + 123.36µs + (24µs-0.96µs) - 24µs*1.333
= 244.52µs
Improved Equation

Equation: Max Latency(Talker) = \( t_{\text{Device}} + (\text{MaxFrameSize+Preamble+SFD+HPG}) + (t_{\text{AllStreams}} - t_{\text{MaxFrame+Preamble+SFD+HPG}}) \times t_{\text{Rate/Bandwidth}} + t_{\text{MaxFrame+Preamble+SFD}} \)
Talker Worst Case Example 1

Worst Case Latency = 197.36µs - tIPG + tDevice
= 197.36µs - 0.96µs + 5.12µs
= 201.52µs

Improved Worst Case Latency Equation:
Worst Case Latency = tDevice + t(\text{MaxFrameSize}+\text{Preamble}+\text{SFD}+\text{IPG}) + (t(\text{AllStreams})+t(\text{MaxFrame}+\text{Preamble}+\text{SFD}+\text{IPG})) \cdot \frac{\text{transmissionRate}}{\text{maxAllocatableBandwidth}} + t(\text{MaxFrame}+\text{Preamble}+\text{SFD})
= 5.12µs + 123.36µs + (40µs-24µs)*100\text{MBit/s} / 32\text{MBit/s} + (24µs-0.96µs)
= 201.52µs
Improved Equation Example 2

Equation: Max Latency(Talker) = t_{device} + (t_{MaxFrameSize+Preamble+SFD+HPG} + t_{(AllStreams)}) * t_{Rate/ABandwidth} + t_{MaxFrame+Preamble+SFD}
Talker Worst Case Example 2

Worst Case Latency = 147.36µs - tIPG + tDevice
= 147.36µs - 0.96µs + 5.12µs
= 151.52µs

Improved Worst Case Latency Equation:
Worst Case Latency = tDevice + t(MaxFrameSize+Preamble+SFD+IPG) + (t(MaxFrame+Preamble+SFD+IPG)) * transmissionRate/maxAllocatableBandwidth + t(MaxFrame+Preamble+SFD)
= 5.12µs + 123.36µs + (24µs-24µs)*100MBit/s / 19.2MBit/s + (24µs-0.96µs)
= 151.52µs
Improved Equation

MaxLatency(Talker) = tDevice + t(MaxFrameSize+Preamble+SFD+IPG) + (tAllStreams - t(MaxFrame+Preamble+SFD+IPG)) * transmissionRate/maxAllocatableBandwidth + t(MaxFrame+Preamble+SFD)
= tDevice + t(MaxPacketSize+IPG) + (tAllStreams - t(MaxStreamPacket+IPG)) * transmissionRate/maxAllocatableBandwidth + tMaxStreamPacket

Device = the internal delay of the device (in slot times, i.e., increments of 512 bit times)
MaxPacketSize = the transmission time for a maximum size interfering packet (maximum size interfering packet (1530 octets to 2008 octets)) plus IPG
MaxStreamPacket = the transmission time for the maximum packet size of the stream that is being reserved
transmissionRate = transmission rate of the medium
maxAllocatableBandwidth = the maximum amount of Class A stream bandwidth the talker is able to allocate
AllStreams = (maxAllocatableBandwidth * tInterval)/transmissionRate
Interval = the Class A observation interval or 125 µs
Thank You