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Coexistence of NET+ARM HDLC with Implementations Supporting Flag Sharing Feature

Description

The HDLC module in NET+ARM chips are implemented in the same way.

The HDLC specification does not require implementation of a flag-sharing. As a result, some implementations have them and some others do not. The performance difference between the two standard interpretations is insignificant. NET+ARM implementation of the standard does not include a flag-sharing feature. This Application Note explains what to do if NET+ARM has to coexist with the systems that use the flag-sharing feature to keep both systems compatible.

Every HDLC frame is preceded by a flag and is followed by another flag. After the acknowledgement is received, the next flag/frame/flag can be sent.

A standard also allows combining train of frames and train of acknowledgments. After x of frames sent, x of acknowledgments should be received.
Flag; Frame; Flag; Flag; Frame; Flag…

According to the standard, the trailing flag and the preceding flag of the next frame can be combined into a single flag:
Flag; Frame; Flag; Frame; Flag…

The NET+ARM does not support this flag-combining feature.

Consequences

HDLC Host mode

In the host mode the NET+ARM will work with all devices although the system speed will be slightly less then with the combined flags. The difference is insignificant.

The following two examples demonstrate how to calculate the overhead when not sharing flags, assuming that no additional flags are inserted in between the frames. In the following examples, it is assumed that only 2 frames are transmitted. The following lengths are also assumed:

Flag = 5 bytes
Address = 1 byte
Control = 1 byte
FCS = 1 byte

Case 1) Information field is assumed to be 128 bytes long:
With flag sharing: 256 information bytes in a total of 271 bytes = 94.46%
Without flag sharing: 256 information bytes in a total of 276 bytes = 92.75%

This results in an overhead of 1.84% when not sharing flags.

Case 2) Information field is assumed to be 1024 bytes long:
With flag sharing: 2048 information bytes in a total of 2063 bytes = 99.27%
Without flag sharing: 2048 information bytes in a total of 2068 bytes = 99.03%

This results in an overhead of 0.24 % when not sharing flags.

HDLC Device mode

In the device mode, in case the external host sends multiple frames with the combined flags, the first frame will be received correctly, next frames will be discarded as erroneous.

Solutions
If the NET+ARM is designated as a host, the system will work correctly. If the NET+ARM is designated as a device, the system designers must be aware of the NET+ARM implementation, and do one of the following:

- Insert an idle flag into the external host, or
- Request an acknowledge after each frame (i.e. not allow frame chaining)

If NET+ARM host is connected to a NET+ARM device, the system will work correctly.