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multiCLASS Operation and Configuration

APPLICATION NOTE - 0122

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Introduction

During local mode operation, iCLASS readers poll for credentials every 100ms by turning on the RF field, sending an application specific message, and listening for a response. If not receiving a response, the reader will shutdown the RF field until the next polling cycle. This process is typically 10ms on, 90ms off.

When attaching a Prox expansion module to the reader, added to the operation is a Prox poll. In this case, the iCLASS reader does not execute the Prox poll. The Prox module executes the Prox poll after receiving a token from the reader – a one-byte message saying, "go". After the iCLASS reader has executed the 13.56MHz poll and the field shutdown, the reader sends this token. The reader does not resume its 13.56MHz polling until it receives a response from the Prox module.

Issues

Deploying combination cards, where both technologies (iCLASS/Prox) are in the same card. Without controls in the reader, the reader reports both tags. The result is duplicate information sent to the panel.

Configuration Parameters

Priority Modes

To control the reading of dual-technology cards, the reader includes a configuration parameter referred to as 'Technology Priority'. There are three settings for this configuration parameter.

- No Priority
- 125kHz (Prox) Priority
- 13.56MHz (iCLASS) Priority

The priority modes are useful when two technologies contain different data (i.e. PIV vs. Prox) or when read range performance differences lead to the non-preferred technology be read and reported before the preferred technology is read.

No Priority Mode

This mode is created for the following situations:

- Single-technology cards are only in use (Prox first, migrating to 13.56MHz technology)
- Dual-technology cards where programmed are both technologies with the same data.

For single-technology cards, No Priority offers the fastest response from the reader.

For dual-technology cards, the reader will read and report the data of the first tag it detects. When the second tag is detected, the data is compared to the previous tag and withheld if there is a match. Presenting cards where the tags have been programmed with different data will cause both tags to be reported.

125kHz Priority Mode

In this mode, the reader gives priority to the 125kHz technology. If a 13.56MHz credential is detected in this mode, the reader will hold the data while it looks for a 125kHz tag. If a 125kHz tag is not detected after a configurable timeout, the reader will report the 13.56MHz tag data. When presented with a single technology 13.56MHz card or a dual technology card where the 125kHz tag has not been programmed, this has the effect of making the card read seem slow.

13.56MHz Priority Mode

In this mode, the reader gives priority to the 13.56 MHz technology. If a 125 kHz tag is detected in this mode, the reader will hold the data while it looks for a 13.56 MHz tag. If a 13.56 MHz tag is not detected after a configurable timeout, the reader will report the 125 kHz tag data. When presented with a single technology 125 kHz card or a dual technology card where the 13.56 MHz tag has not been programmed, this has the effect of making the card read seem slow.

Protocols and Applications

In addition to the controls listed above, the protocols and applications for a reader may be configured to be enabled or disabled. The iCLASS reader can support up to 8 RF protocols as listed below:

- ISO-15693
- ISO-14443 – Type A
- ISO-14443 – Type B
- Pico-15693
- Pico-14443 – Type B
- Felica – Type A
- Felica – Type B
- Felica – Type C
- 125kHz

Each protocol – with the exception of 125kHz – can have up to eight applications assigned. Different 125kHz technologies are made available by plugging in different modules.

Pitfalls

RF Performance

The nature of RFID is that there can be differences in the performance of the two technologies that cause the reader to behave differently than the way it is configured. For example, the 125kHz technology can often end up with a greater read range than the 13.56MHz technology it is combined with. Also, one or both technologies can have small holes where the credential can't be read caused by an environmental variable such as a mounting surface that detunes the reader. In these situations, it is possible for the preferred technology to be ignored in favor of the non-preferred technology.

Latency

As described above, with priority there is latency with single technology cards that are non-priority, or multi-technology cards where the reader fails to read the preferred technology. This latency is determined by the timeout configuration parameter.

Default Configurations

The factory default for all multi-technology iCLASS readers is listed in the following table:

Priority Mode	Timeout	Protocols	Applications
13.56MHz	500ms	Pico-15693	HID Access Ctrl App
		ISO-14443 – Type A	UID (CSN)
		125kHz	(module dependent)

Configuration Cards

The following table lists the configuration cards available through HID Technical Support:

Part Number	Priority Mode	Timeout	Protocols	Applications
2000-04-03-000019	None	N/A	Pico-15693	HID Access Ctrl App
			ISO-14443 – Type A	UID (CSN)
			125kHz	(module dependent)
2000-01-03-000001	13.56MHz	500ms	Pico-15693	HID Access Ctrl App
			ISO-14443 – Type A	UID (CSN)
			125kHz	(module dependent)
2000-04-03-000008	125kHz	500ms	Pico-15693	HID Access Ctrl App
			ISO-14443 – Type A	UID (CSN)
			125kHz	(module dependent)
2000-04-03-000015	None	N/A	125kHz	(module dependent)
			ISO-14443 – Type A	PIV
2000-04-03-000013	125kHz	500ms	Pico-15693	HID Access Ctrl App
			ISO-14443 – Type A	PIV
			ISO-14443 – Type B	PIV
			125kHz	(module dependent)
2000-04-03-000012	13.56MHz	500ms	Pico-15693	HID Access Ctrl App
			ISO-14443 – Type A	PIV
			ISO-14443 – Type B	PIV
			125kHz	(module dependent)

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