



St. Petersburg State University of Aerospace Instrumentation
Institute of High-Performance Computer and Network Technologies

**Extended Control Codes
for Distributed Interrupts in SpaceWire Networks**
(draft 1.0)

Yuriy Sheynin, Sergey Gorbachev
Sheynin@online.ru

29th of October, 2004

St. Petersburg

NOTE The Time-Code is used to distribute system time information (see subclause 8.12) and control flags (C6=0, C7=0) isochronous with the time-code distribution.

- f. Six bits of interrupt information shall be held in the least significant six bits of the Interrupt-Code (I0-I5) and the two most significant bits (C6=0, C7=1) shall contain control flags that are distributed isochronously with the Interrupt-Code.

NOTE The Interrupt-Codes is used to distribute interrupt request information from interrupt sources (see subclause 8.13) and control flags (C6=0, C7=1) isochronous with the interrupt-code distribution.

- g. Six bits of interrupt pole information shall be held in the least significant six bits of the Pole-Code (I0-I5) and the two most significant bits (C6=1, C7=0) shall contain control flags that are distributed isochronously with the Pole-Code.

NOTE The Pole-Code is used to distribute interrupt pole information from interrupt handlers (see subclause 8.13) and control flags (C6=1, C7=0) isochronous with the pole-code distribution.

8.13. System interrupts distribution (normative)

8.13.1 General

As defined in subclause 7.3, a interrupt control codes (Interrupt-Code and Poll-Code) comprises the ESC character followed by a single 8-bit data character. The data character contains two control flags (C6, C7) and a six-bit interrupt source identifier.

8.13.2 Handling

- a) Interrupt code represents an interrupt request. It shall be issued by a node that will be considered as the interrupt-master for this interrupt.
- b) One of 64 interrupt signals (interrupt source identifiers) could be identified by the Interrupt code.
- c) Any link controller shall manage the distribution of the interrupt request and poll information.
- d) Each node or router shall contain one 64-bit interrupt source register (ISR) for Interrupt codes distribution.
- e) The interrupt-master link interface shall have an INTR_IN input, which can be asserted by its host system – the interrupt source.
- f) When the interrupt-master link interface receives an interrupt request (INTR_IN is asserted) with a six-bit interrupt source identifier, it shall set an appropriate bit to '1' in the 64-bit ISR. Then it shall send out an Interrupt-Code with the six-bit interrupt source identifier field of the data character and the other two bits set to the C6=0, C7=1 value of the control flags.
- g) The Interrupt-Code shall be sent out as soon as the current character or control code would be transmitted. However, the Time-code shall have priority for transmission over the Interrupt-code.
- h) Interrupt-Codes shall not be sent out until the link interface is in the Run state (see subclause 8.5).

- i) When a link interface in a node or in a router receives an Interrupt-Code it shall check the correspondent bit in the 64-bit ISR to be reset to '0'. If the bit is '0' then the link controller shall set the correspondent bit in the ISR to '1' and assert its INTR_OUT output signal at the link controller interface. It can be accompanied by the six-bit interrupt source identifier of the incoming Interrupt code.
- j) If the router or node receives an Interrupt-Code and the correspondent bit in the 64-bit ISR is equal to '1' the Interrupt-Code shall be ignored and the link interface should not issue the INTR_OUT output signal.
NOTE. It prevents repeated Interrupt-Code propagation in a circular network.
- k) In a node, the INTR_OUT signal goes to the host, where it can be used as a hardware interrupt request.
- l) In a router the INTR_OUT signal propagates to all the links' output ports of the router (except the port that have issued the INTR_OUT signal) so that they all emit the Interrupt-Code with the same control flags (C6=0, C7=1) and the same six-bit interrupt source identifier field of the data character, which was received by the router.
- m) An Interrupt-Code should be accepted for handling in some node of the SpaceWire interconnection. The node will be called the Interrupt Handler.
- n) In a node, which can be an Interrupt Handler, the link interface shall have a POLL_IN input, which can be asserted by its host system – the interrupt handler, in response to an Interrupt-Code receipt.
- o) When the link interface receives an Interrupt poll (POLL_IN asserted) with a six-bit interrupt source identifier it shall reset appropriate bit in the 64-bit ISR to '0' and then send out a Poll-Code with the six-bit interrupt source identifier field of the data character. The other two bits shall be set to the value of the control flags C6=1, C7=0.
- p) The Poll-Code shall be sent out as soon as the current character or control code is transmitted. The Time-code shall have priority for transmission over the Poll-Code. The Poll-Code shall have priority for transmission over an Interrupt-Code.
- q) Poll-Codes shall not be sent out until a link interface is in the Run state (see subclause 8.5).
- r) When a link controller in a node or in a router receives a Poll-Code it shall check the correspondent bit in the 64-bit ISR to be set to '1'. If the bit is '1' then the link controller shall reset it to '0'.
- s) If the node was the source of the Interrupt-Code, for which the received Poll-code is the reply, the link interface shall assert its Poll_OUT output signal at the link controller interface. It can be accompanied by the six-bit interrupt source identifier from the incoming Poll-Code.
- t) In a router the Poll_OUT signal propagates to all the links' output ports of the router (except the port that have issued the Poll_OUT signal) so that they all emit the Poll-Code with the same control flags (C6=1, C7=0) and the same six-bit interrupt source identifier field of the data character, which was received by the router.

- u) If a router or a node receives a Poll-Code and the correspondent bit in the 64-bit ISR is equal to '0' the Poll-Code shall be ignored and the link interface should not issue the Poll_OUT output signal.

NOTE. It prevents repeated Poll-Code propagation in a circular network.