

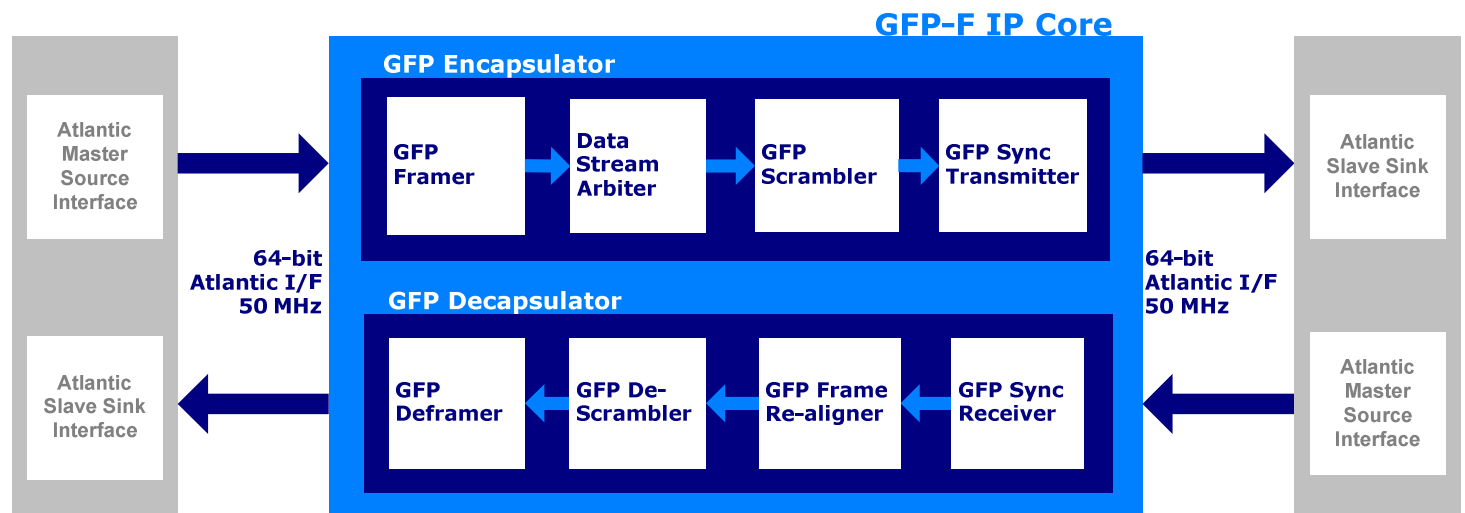
OVERVIEW

The frame-mapped GFP-F IP Core receives and maps entire client signal frames into one GFP frame adhering to the format set out for the frame-mapped GFP mode of client signal adaptation. The GFP-F Core encapsulates entire octet-aligned, variable-length client signal frames into one GFP frame. The core is available for Altera Stratix, Stratix-II, Stratix GX / II GX, Cyclone, and Cyclone-II devices and utilizes an Altera-standard Atlantic interface. A microcontroller register interface for parameter setting and status monitoring is included.

FEATURES

- Fully Compliant with Frame Mapped GFP Specification from ITU-T
- GFP Control Frames are supported at a maximum of 10% of full line-rate
- Encapsulator receives frames from multiple channels and individually maps frames into single GFP frames
- Decapsulator receives frame-mapped GFP frames and removes various GFP-unique fields
- GFP and Ethernet configuration and status signals can be mapped to a microcontroller (MCU) interface
- Parameter and status signals can be connected to an MCU interface such as an 8051 or I²C
- Extension Header supports a Linear (Point-to-Point) connection
- Minimum packet-size is 32 bytes
- Control frames always have higher priority than user data frames / packets
- The inter-packet gap at the Ingress input must be a minimum of 2 cycles
- Atlantic Interface: Datapath interfaces to the 64-bit Atlantic Specification at 50 MHz

BLOCK DIAGRAM



DEVICE UTILIZATION

TARGET DEVICE	SPEED GRADE	UTILIZATION		PERFORMANCE (MHz)
		LEs	Memory Bits	
Altera Stratix EP1S	-5	5862	21704	61.42
Cyclone II EP2C	-7	4942	21704	61.61
		ALMs	Memory Bits	
Altera Stratix-II EP2S	-3	2161	21704	98.49

GFP-F I/O SIGNAL LIST

SIGNAL NAME	I/O	DESCRIPTION
General Signals		
clk	I	Clock @ 50 MHz
reset_n	I	Global asynchronous reset signal
GFP Encapsulator Input Atlantic Interface		
cti_dav	O	Data available. There is enough space for data to be written
cti_ena	I	Data transfer enable; validates cti_dat.
cti_dat [63:0]	I	Data bus
cti_sop	I	Start of packet
cti_eop	I	End of packet
cti_err	I	Error in packet
cti_mty [2:0]	I	Number of invalid bytes of data on the data bus. mty = '000' ,all dat bytes are valid mty = '001' ,dat [7:0] are invalid mty = '010' ,dat [15:0] are invalid mty = '011' ,dat [23:0] are invalid mty = '100' ,dat [31:0] are invalid mty = '101' ,dat [39:0] are invalid mty = '110' ,dat [47:0] are invalid mty = '111' ,dat [55:0] are invalid This signal is valid upon the reception of a valid SOP unlike what is indicated by the Atlantic Interface. However, it is still corresponds to the number of invalid bytes of data on the data bus for the EOP. It is used to calculate the PLI field for the GFP header.
cti_apl [10:0]	I	Length of incoming packet in terms of Atlantic words.
cti_cid [7:0]	I	Channel ID field used to indicate one of 256 communication channels at a termination point.
GFP Encapsulator Input Control Frame Interface		
cti_control_dav	O	Room available to accept control frame
cti_control_val	I	Validates control frame signals
cti_control_pli_select [1:0]	I	Valid values for this bus are 1, 2, and 3. This bus determines the value placed in the PLI field of the GFP core header of the control frame.
cti_control_message[47:0]	I	OA&M message bus

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GFP-F I/O SIGNAL LIST (CONTINUED)

SIGNAL NAME	I/O	DESCRIPTION
GFP Encapsulator Output Atlantic Interface		
gto_ena	O	Data transfer enable; validates gto_dat.
gto_dat [63:0]	O	Data bus
gto_sop	O	Start of packet
gto_eop	O	End of packet
gto_err	O	Error in packet
gto_mty [2:0]	O	Number of invalid bytes of data on the data bus. mty = `000`, all dat bytes are valid mty = `001`, dat [7:0] are invalid mty = `010`, dat [15:0] are invalid mty = `011`, dat [23:0] are invalid mty = `100`, dat [31:0] are invalid mty = `101`, dat [39:0] are invalid mty = `110`, dat [47:0] are invalid mty = `111`, dat [55:0] are invalid
GFP Decapsulator Input Atlantic Interface		
gti_dav	O	Data available. The GFP decapsulator has space to receive GFP frames.
gti_ena	I	Data transfer enable; validates gti_dat.
gti_dat [63:0]	I	Data bus
gti_sop	I	Start of packet – NOT USED
gti_eop	I	End of packet – NOT USED
gti_err	I	Error in packet
gti_mty [2:0]	I	Number of invalid bytes of data on the data bus. – NOT USED
GFP Decapsulator Output Atlantic Interface		
cto_dav	I	Data available. The client has space to receive data.
cto_ena	O	Data transfer enable; validates cto_dat.
cto_dat [63:0]	O	Data bus
cto_sop	O	Start of packet
cto_eop	O	End of packet
cto_err	O	Error in packet.

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GFP-F I/O SIGNAL LIST (CONTINUED)

SIGNAL NAME	I/O	DESCRIPTION
GFP Decapsulator Output Atlantic Interface		
cto_mty [2:0]	O	Number of invalid bytes on the data bus. mty = '000', all dat bytes are valid mty = '001', dat [7:0] are invalid mty = '010', dat [15:0] are invalid mty = '011', dat [23:0] are invalid mty = '100', dat [31:0] are invalid mty = '101', dat [39:0] are invalid mty = '110', dat [47:0] are invalid mty = '111', dat [55:0] are invalid
cto_cid [7:0]	O	Channel ID field used to indicate one of 256 communication channels at a termination point.
GFP Decapsulator Output Control Frame Interface		
cto_control_val	O	Validates cto_control_dat.
cto_control_pli_select [1:0]	O	Valid values for this bus are 1, 2, and 3. This bus indicates the type of OA&M message being output.
cto_control_message [47:0]	O	OA&M message
Register Interface		
encap_pli_error	O	Asserted if PLI is less than 4 for data frames
spare_field [7:0]	I	Spare field of GFP extension header
ccf_ofl	O	Client control framer FIFO overflow
ccf_ufl	O	Client control framer FIFO underflow
dsa_ofl	O	Data stream arbiter FIFO overflow
enable_scrambler	I	Enable scrambling if asserted.
gfp_receiver_out_of_sync	O	GFP decapsulator out of sync error. Asserted when properly formatted core header is not received according to PLI of previous packet.
gr_ofl	O	GFP realigner FIFO overflow.
cto_control_err	O	Error in the control Frame if either of the following is true: - CRC Error - Error during the first or second cycle of the packet at the input - second valid is not an EOP with MTY=4
chec_error	O	cHEC error.
thec_error	O	tHEC error.
ehec_error	O	eHEC error.
ex_missing_eop	O	Missing EOP error