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# UART CRC32 APPLICATION

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On TMS570LS12x



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# UART CRC32 Application

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## Overview

This embedded application runs on the **TMS570LS1227CZW (TMS570LS12x)** microcontroller and calculates the Ethernet CRC32 checksum over a UART byte stream. It uses the **SCI2 (USB UART)** interface with a fixed **baud rate of 937500 bps**. The system is connected and debugged using an **XDS100v2** interface.

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## 1. Functional Description

- The MCU continuously receives bytes over UART.
  - When UART becomes idle for **500 milliseconds**, the CRC is calculated over all received bytes.
  - The CRC result is transmitted back via UART in **uppercase hexadecimal format**, with a textual prefix.
  - If no new bytes are received in the next cycle, the same CRC is re-sent with a message indicating no data was received.
  - The application supports a maximum data buffer size of 4096 bytes. If more than 4096 bytes are sent, only the first 4096 bytes will be used for CRC calculation. Any additional bytes are ignored.
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## 2. UART Configuration

Parameter	Value
UART Interface	SCI2 (USB UART)
Baud Rate	937500
Data Bits	8
Stop Bits	2
Parity	None
Flow Control	None
TX Pin	Configured via HALCoGen
RX Pin	Configured via HALCoGen
Max Payload Length	4096 bytes

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### 3. CRC32 Calculation Details

Property	Value
Algorithm	Ethernet CRC (CRC-32/ISO-HDLC)
Polynomial	0x04C11DB7
Initial Value	0xFFFFFFFF
Input Reflected	Yes (per-byte)
Output Reflected	Yes
Final XOR Value	0xFFFFFFFF
Example Input	123456789
Expected CRC	0xCBF43926

### 4. Idle Detection Logic

- Data collection continues until no new byte is received for **500 ms**.
- At this point, the CRC is calculated and sent.
- On the next loop:
  - If **new data is received**, the buffer is extended and CRC is updated.
  - If **no new data**, the last CRC is resent with a different message.

### 5. UART Output Messages

- On startup:
 

Sequential CRC Calculator Started  
UART Ready. Send data...
- After CRC calculation:
 

Updated CRC in Hex is : 0xFFFFFFFF
- On repeated idle:
 

No Data Received, Last Calculated CRC in Hex is : 0xFFFFFFFF

## 6. Hardware and Tools

Component	Details
MCU	TMS570LS1227CZW (TMS570LS12x)
Debug Interface	XDS100v2
SCI Interface	SCI2
Baudrate	937500
UART Tool (PC-side)	TeraTerm or RealTerm
TeraTerm Delay Settings	1–2 ms per byte (required)