



Department of Applied Computing



# SpaceWire Demonstrator

ESTEC

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# Agenda

- Overview of Demonstration System
  - Instruments
  - Mass Memory Unit
  - Processor
  - Telemetry and Telecommand
  - RMAP
  - Network Configurations
- Demonstration

# The Demonstration System

- Simulation of onboard data handling network
- Four types of units:
  - Telemetry and Telecommand
  - Processor
  - Mass Memory Unit
  - Instruments
    - Camera Instrument
    - File Instrument
    - Pointer Instrument

# Instruments

- Three different Instrument types currently defined:
  - Camera Instrument
  - File Instrument
  - Pointer Instrument
- The maximum data rate used by each Instrument can be configured
- Future Instrument types can easily be created using the base classes which provide much of the functionality

# Camera Instrument

- Sends images generated by a camera to the MMU
- Can be set to send all images recorded by the camera
- Or can be commanded to send a single image
- The images can be displayed at the TM/TC

# Camera Instrument



# File Instrument

- Sends files read from a directory to the MMU
- Can be set to send all files in the directory
- Or can be commanded to send a single file
- If the files contain images, these can be displayed at the TM/TC unit

# Pointer Instrument

- Sends mouse pointer position information to the MMU
- Can be set to send all mouse movements
- Or can be commanded to send a single position
- The mouse position can be displayed at the TM/TC unit
- Different from the other two Instruments as the data is not sent at a steady rate



# Mass Memory Unit

- Allows channels to be created to store data from Instruments
- Can be commanded by the Processor to transfer data from the channels to the TM/TC
- Graphically represents the amount of data in each channel

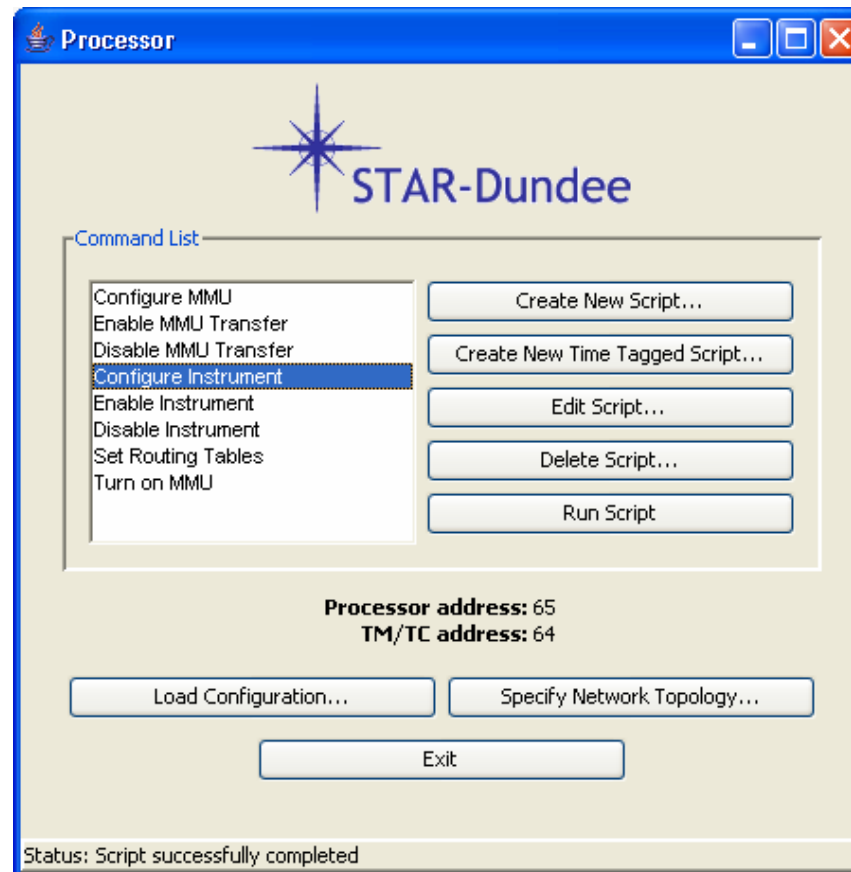
# Mass Memory Unit

The screenshot shows a software window titled "Mass Memory Unit" with a blue title bar and standard Windows window controls. The main area has a light beige background. At the top center is the STAR-Dundee logo, a blue starburst with the text "STAR-Dundee" to its right. Below the logo is a progress bar for "Channel 0" with markers at 0%, 50%, and 100%. The bar is filled with red to approximately 86%, and a green dot is at the end. To the right of the bar, the following text is displayed: "Channel: 0", "Source Address: 67", "Size: 40960", "In Use: 86%", and "Status: Not Sending". Below the progress bar are two radio buttons: "Percentage View" (selected) and "Byte View". To the right of these are a "Configure Channels.." button and a green "No Error" indicator. At the bottom of the main area are three buttons: "Save Configuration...", "Load Configuration...", and "Exit". A status bar at the very bottom of the window displays "Status: Active".

# Processor

- Can execute commands, e.g.:
  - Set-up routing tables
  - Configure Instruments
  - Configure MMU channels
  - Enable an MMU
  - Transfer data from an MMU
- May be instructed by TM/TC to execute these commands
- Read the status of the devices on the network

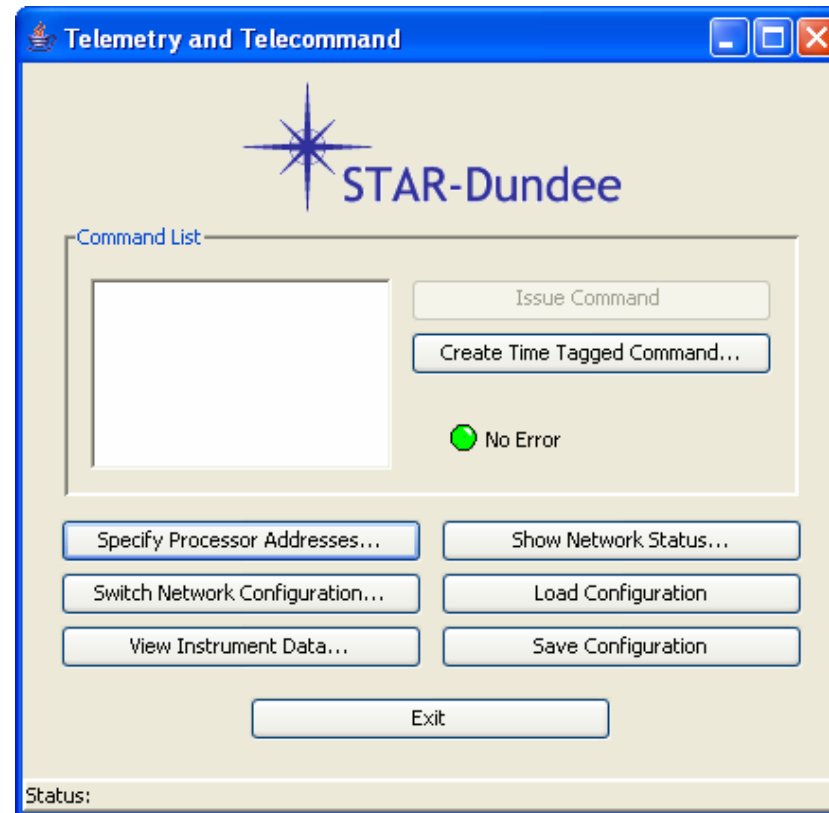
# Processor



# Telemetry and Telecommand

- Specify the Processors to communicate with
- Switch between prime and redundant configurations
- Issue commands to be executed at the Processor
- Upload commands to the Processor
- View the data transmitted from the MMU
- Display the status of the devices on the network

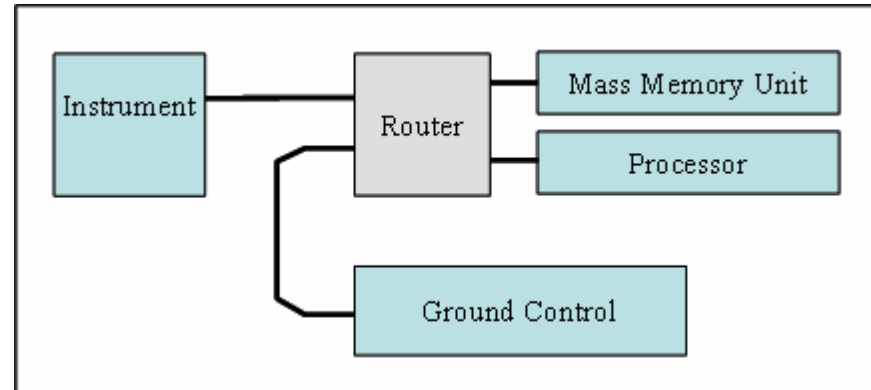
# Telemetry and Telecommand



# Remote Memory Access Protocol

- RMAP used for all communication
  - Read and write commands used
  - Incremental and non-incremental operations
  - Acknowledged and unacknowledged writes
  - MMU uses extended address field to indicate the channel number
- Latest draft (Draft F) with updated CRC used

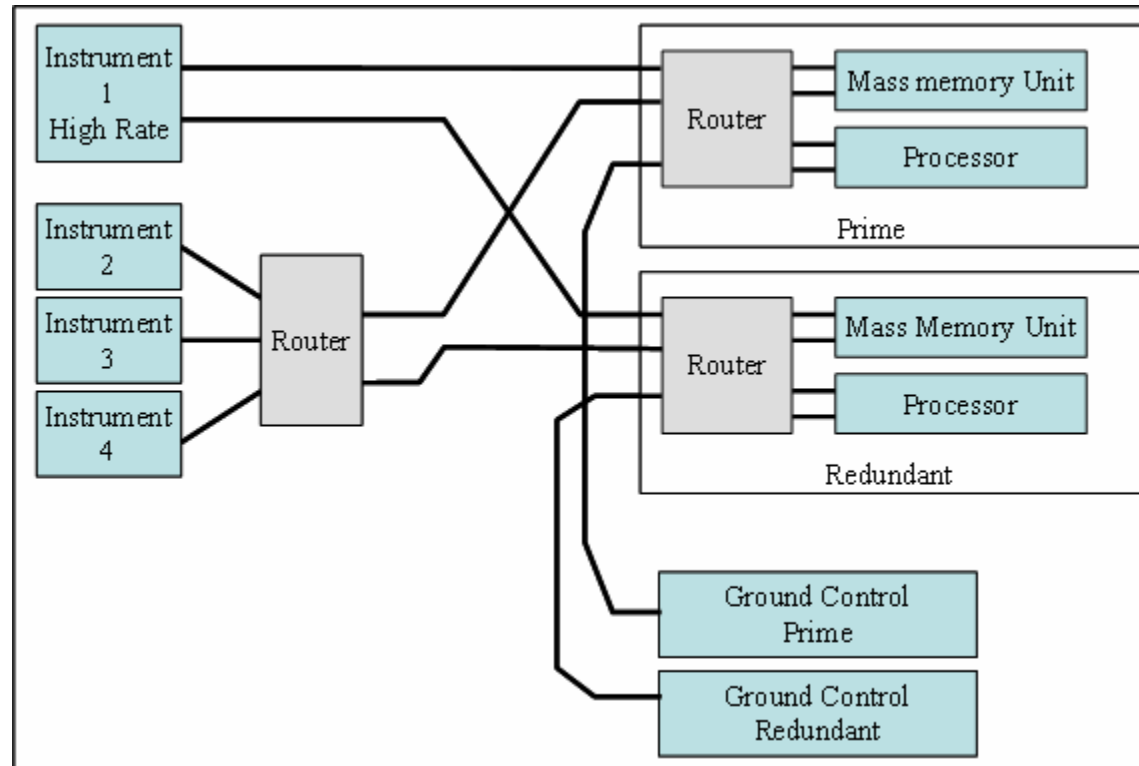
# Network Configurations



- **Basic System**
  - No redundancy
  - One of each component
  - All exchanges through the router

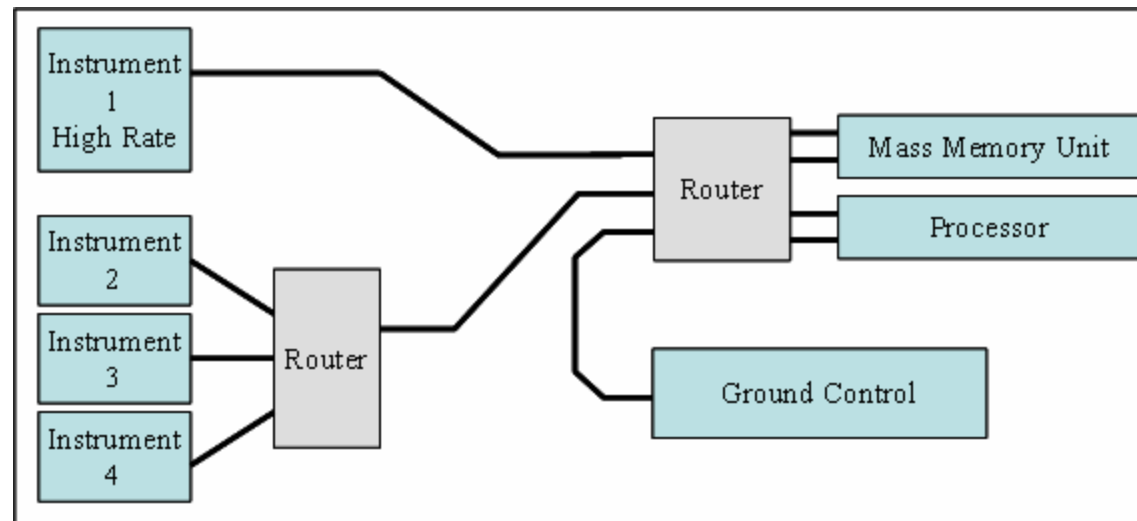


# Network Configurations



- System with redundancy
  - Redundant MMU/Processor/router and TM/TC blocks

# Network Configurations



- Multiple Instrument System
  - No redundancy of components
  - High rate Instrument connected directly to the MMU/Processor router
  - Multiple links to Processor and MMU



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# Demonstration