



Overview of DCART and DESC

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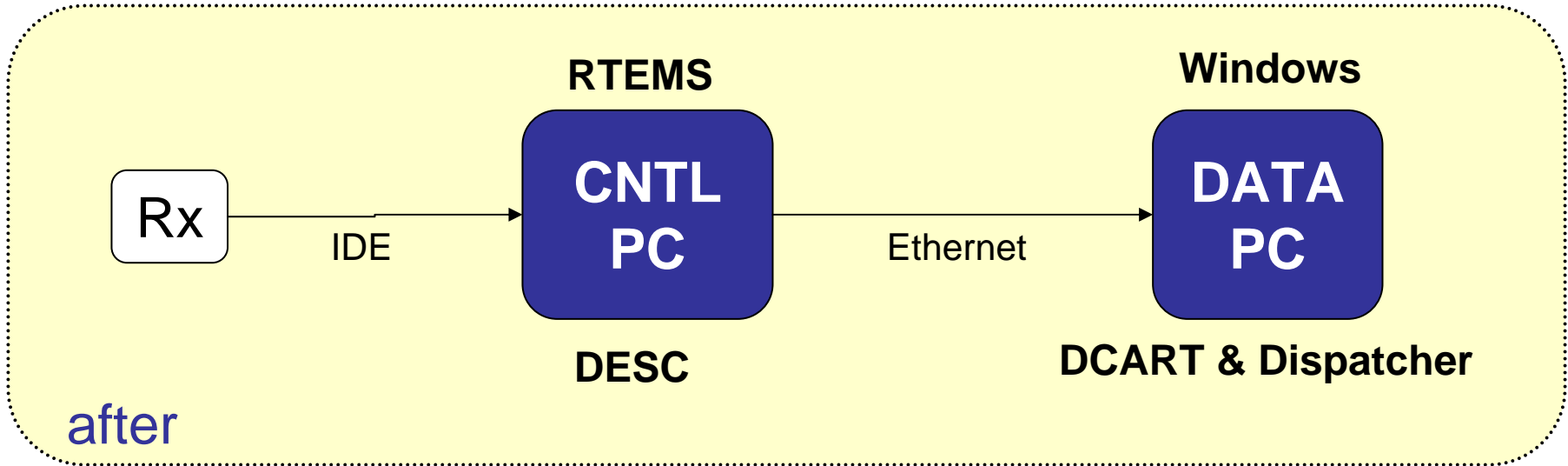
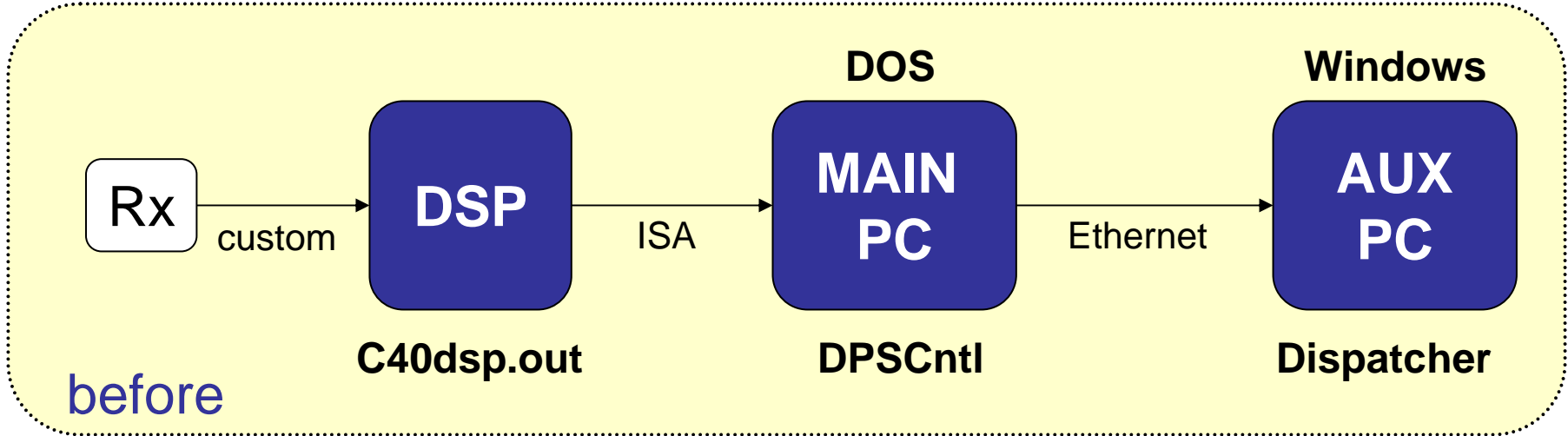


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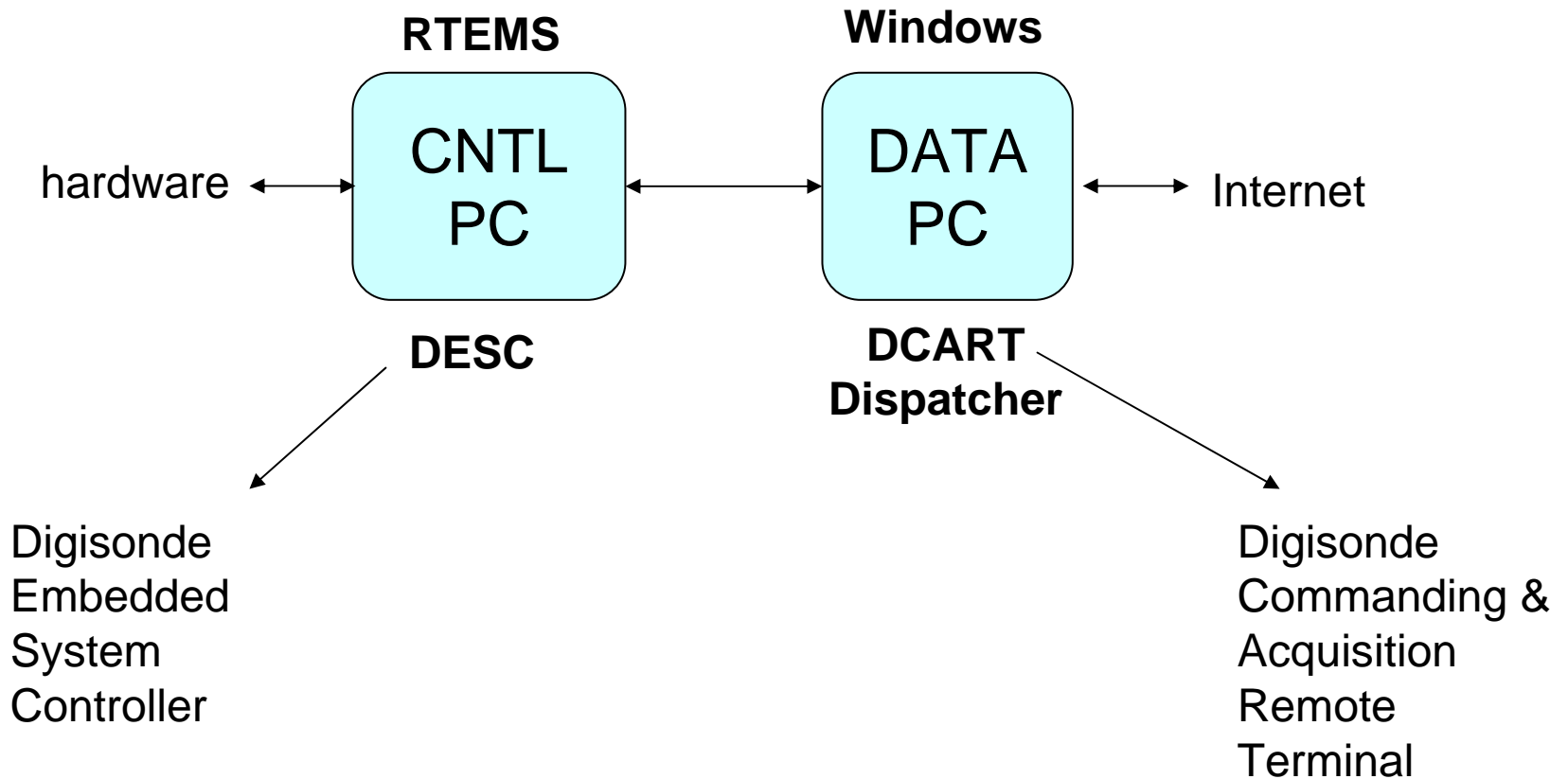
Cast and Credits

- DCART and DESC software team:
 - Ivan Galkin: GUI, RPI technology transfer
 - Grigori Khmyrov: DESC lead, DCART
 - Alexander Kozlov: DCART lead
 - Dima Paznukhov: modeling & prototyping
 - Sudha Shunmugam: BIT and Tracker CAL operations in DCART and DESC
 - George Cheney: consulting on RTOS and RPI

Change of Paradigm

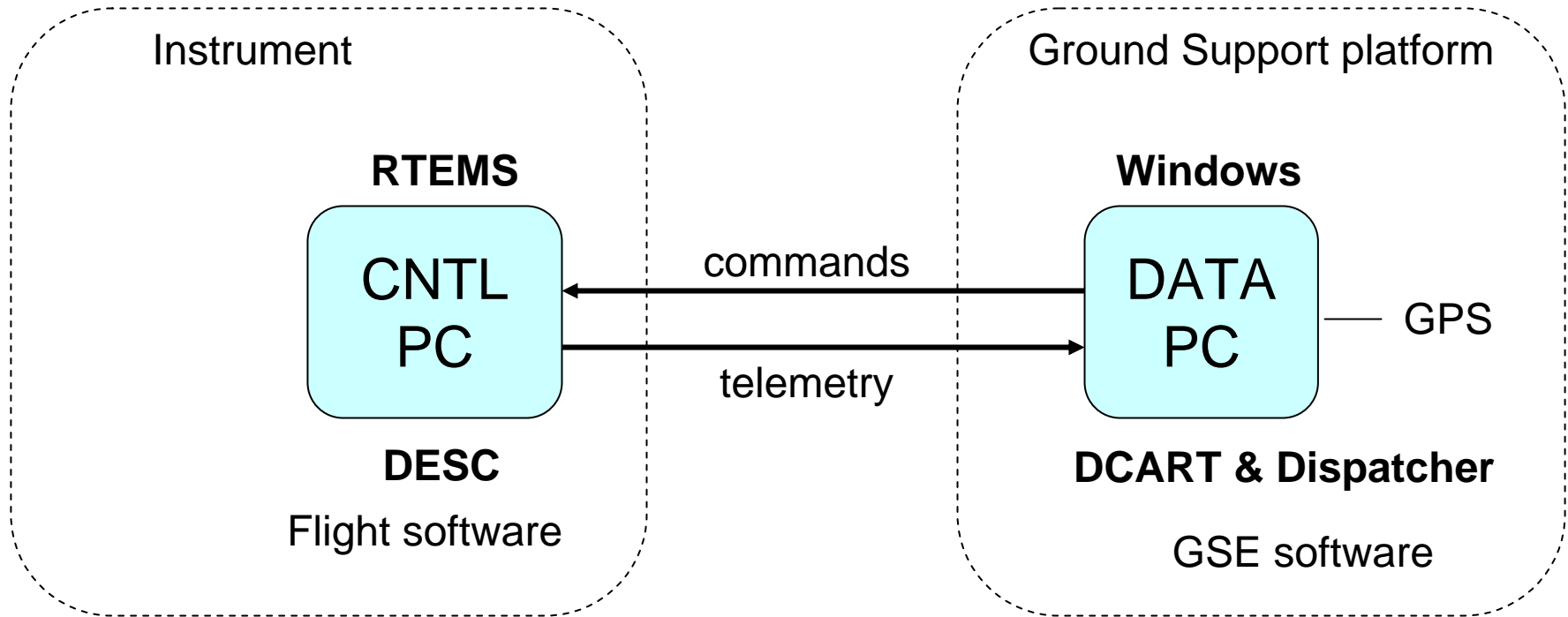


DESC and DCART



Unified Configuration

with other UMLCAR-built space instrumentation



NO MONITOR
NO KEYBOARD
NO MOUSE
NO HARD DISK
NO FLOPPIES

C&T
+ MISSION PLANNING

C&T

Concept inherited from RPI design for NASA

- **Command packets**

- 0x32 Flush SST Queue
- **0x70 Periodic Message**
- 0x71 Upload Program
- 0x72 Start Program
- 0x73 Stop
- 0x74 Upload Schedule
- 0x75 Start Schedule
- 0x76 Upload SST
- 0x77 Upload RFIL
- 0x78 Clear RFIL
- 0x79 Reboot
- **0x81 Standby State**
- **0x82 Diagnostic State**
- **0x84 Auto-scheduled State**
- 0x33 Auto-drift selection

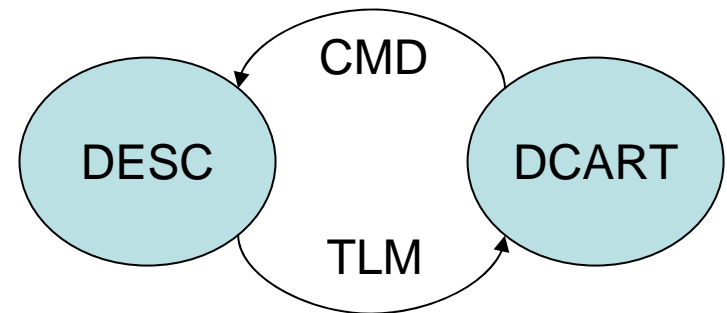
- **Telemetry packets**

- *Science*

- 0x81 Science Data

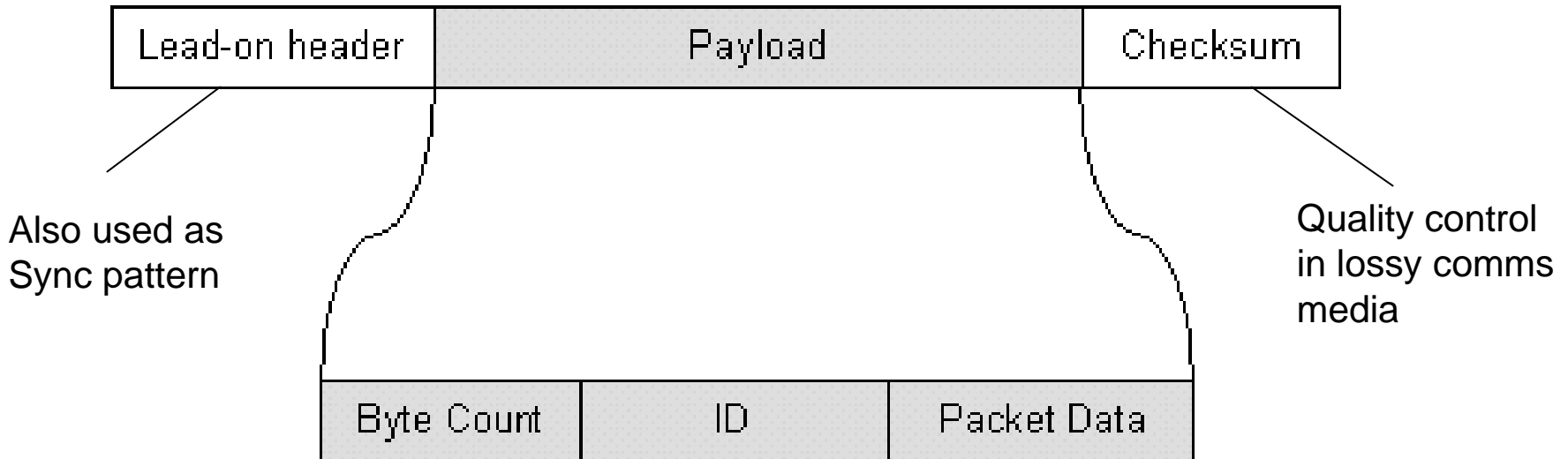
- *Housekeeping*

- 0x01 “I am Alive”
- 0x02 “Event Message”
- 0x03 “Error Message”
- 0x04 “Countdown”
- 0x05 “BIT”



Packet Design

Concept inherited from RPI design for NASA



Operating States

new language

SPACE INSTRUMENTATION TERMINOLOGY

- **SAFE** = CNTL platform is powered down [“safe” for upcoming hazardous impact, loss of spacecraft power, etc.].
 - DCART shows SAFE if
 - CNTL platform is down,
 - Two platforms not connected after DPS reboot,
 - DESC not running.
- **STAND-BY** = CNTL platform runs computer only, other systems are down
 - Used for software and configuration updates
 - Digisonde TX chassis is powered down
- **DIAGNOSTIC** = CNTL platform is fully operational, but no measurement will start without manual command
 - Used for manual operations, program/schedule design, etc.
- **AUTO-SCHEDULED** = All systems up, measurements are running automatically according to the programmed schedules
 - Routine operations

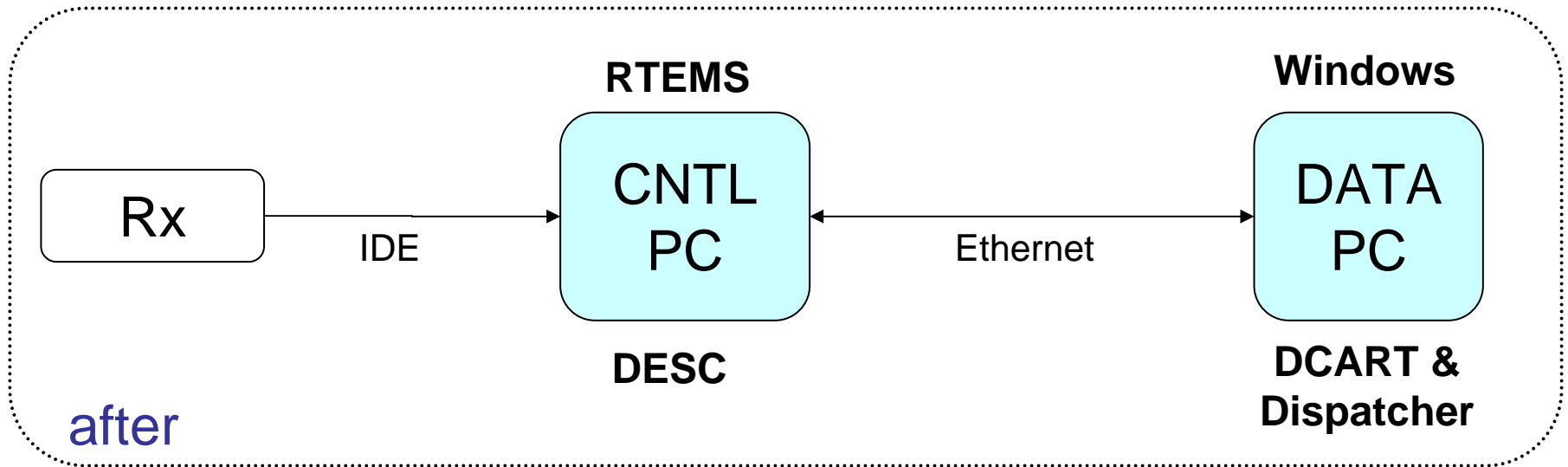
Operational Modes

- **SCIENCE**
 - Sounding
 - Optional loopback
 - Optional Radio Silence
- **HOUSEKEEPING**
 - BIT
 - Channel EQ
 - Tracker Calibration

Test Pattern

- All operational modes can be run as the “test pattern” operation, where telemetry data packets are filled with pre-defined, known contents

100% of Samples Delivered to Data Platform for Processing



PERFORMANCE ISSUES?

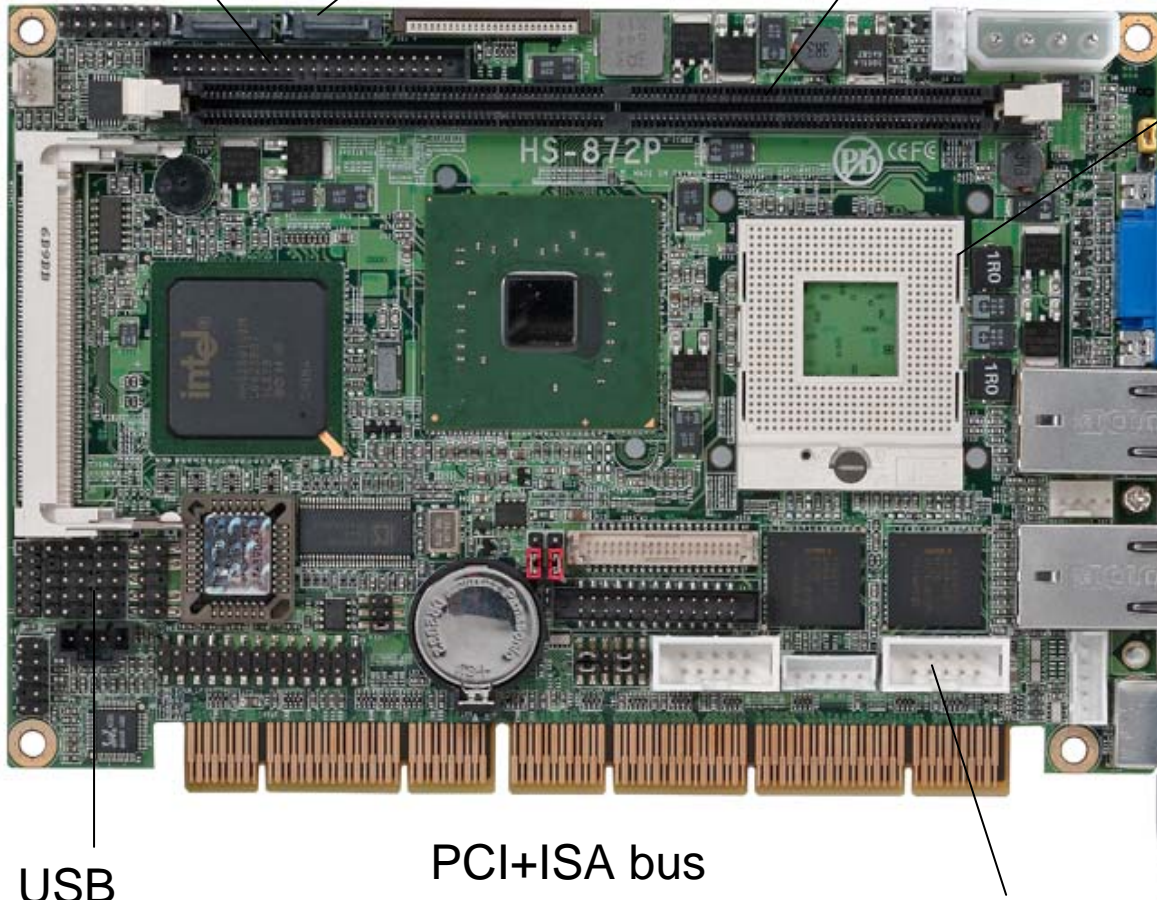
HS-872PDG2 by COMMEL

IDE for DVD-RW

SATA HDD

2 GB RAM

Intel Mobile Core 2 Duo 2.2 GHz



VGA

to DESC

to Internet

mouse

USB

PCI+ISA bus

COM1 for GPS

Data Computer is Linux-ready

well, almost...

- **Major software components are written in Java**
 - DCART
 - ARTIST 5
 - All picture-making tools
- **C++ components that should be possible to gcc compile, with little change**
 - Dispatcher
 - UniSearch & Latest web scripts
- **FORTRAN components to compile for Linux**
 - DDAS
 - DDAV
 - NHPC (done)
- **Components that will need extra attention**
 - Software watchdog and its support in Dispatcher
 - FTP client (use SFTP client instead?)

Greater Detail of DESC & DCART

- DESC and DCART implementations will be available in the 2007 DPS models
- Interface for digisonde operations changes first time since 1990
 - Same for local and remote ops
 - See measurements as they are being made from a remote location over Internet
- Discussion of new operating concepts is beneficial for both developers and users