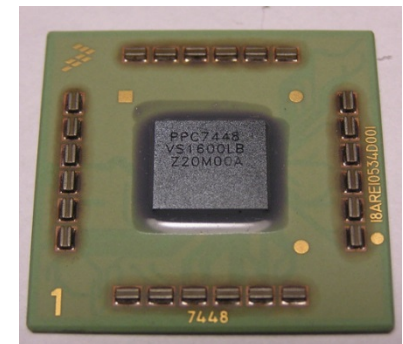


# Wrap-up and Open Discussion: Do we have the technology available?

ADCSS 2013  
24/10/2013

1. Both ADR and Precise Landing have significant processing requirements
  - a. IP: Feature Identification, Model matching
  - b. High levels of autonomy required
  - c. Significant MWIPS in excess of current space-qualified processors
  
2. Multi-core processors / Heterogeneous architecture may be a solution?
  - a. Potentially this will have a significant effect on the system.

1. When can we fly >2000 Wheatstone MIPS?
  - a. Antonio: >2000 MWIPS required for vision-based navigation
  - b. HARVD study: Intel Core2 2.4GHz (~2100 MWIPS) required 2.5 seconds per image
  - c. 4 x 400MHz LEON4FT ~ 960 MWIPS (~0.6 MWIPS/MHz)
  - d. Required soon (say TRL3 in 5 years)?
  
2. In what form should High-MIP processors take?
  - a. Terrestrial processors + radiation hardening?
    - Eg. CNES study looked at PPC7448 SOI
  - b. Dedicated FPGA?
  - c. Improved LEON SoC?



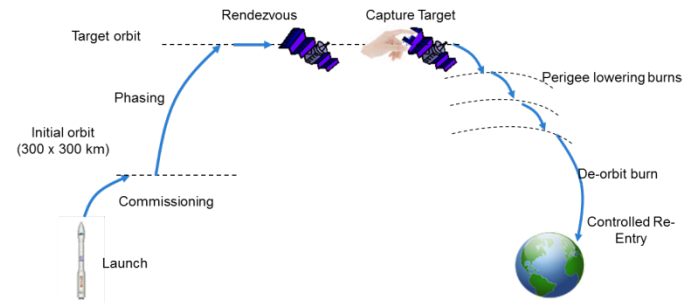
1. What are the implications of going to Multicore?
  - a. What effects would a Multicore OS have on the system, or would it be “transparent”?
  - b. High-performance applications must be multi-threaded?
  - c. Do application designers need to target a certain number of cores?
  - d. Can Matlab / Simulink autocode + Real-time Workshop handle multithread / multicore architecture?
  
2. How is time distribution, time stamping and time synchronisation / correlation affected by going to multicore?
  - a. Do multicore all use the same clock?
  - b. Is one core responsible for servicing PPS inputs (eg. latching clock value) or generating PPS outputs?
  
3. Failed Core?

1. For ADR, how much should humans be included in the loop?
  - a. Complete control, teleoperation from Ground
  - b. Teleoperation of robotic capture only
  - c. Go / No-go points
  - d. No human in the loop, fully autonomous
  - e. Other?



# Key developments required

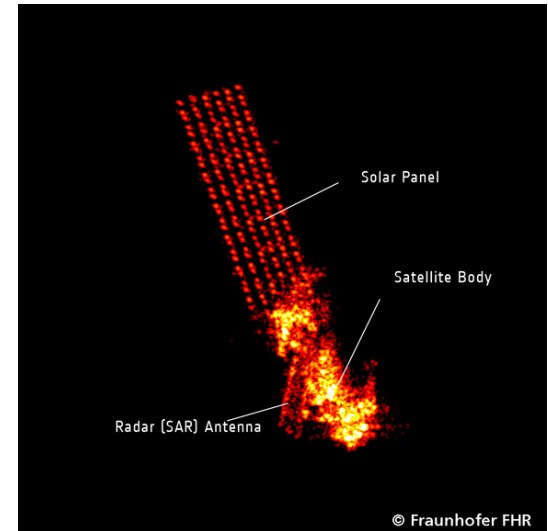
1. What are the most pressing development needs for ADR?



2. What are the most pressing development needs for Precision Landing?



1. What is the most suitable sensor for ADR for an uncooperative target, taking into account performance, robustness and cost?
  - a. LIDAR
  - b. Visible
  - c. Infra-Red
  - d. Stereo (Visible or Infra-Red)
  - e. mm-wave Radar



1. How representative can Dynamic Hardware-in-the-loop tests be:
  - a. For precision landing?
  - b. For ADR tether deployment and control?
  - c. For long-range ADR Rendezvous using cameras?
  
2. For these scenarios, are Dynamic HIL tests justified in terms of the expected costs?