SpaceWire Protocol Stack

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Current Status

- The current stack of SpaceWire protocols has evolved bottom-up
  - This has been driven by need
  - With immediate needs addressed first
- This has been a very successful approach
  - Requirement driven
  - Efficient
  - Low risk of a solution looking for a problem
  - Lower risk of unnecessary complexity
- However...
- As we come to try and put more pieces together there is a lack of coherency which makes the job difficult

Network Management

- Typically each element of a stack needs some management
- The *mechanisms* for the management of each element tend to be similar
  - Even if the management parameters are different
- One network management protocol could offer the necessary mechanisms for the complete SpaceWire stack
- But...
- In order to develop this protocol we need some idea of the complete stack

Top Down Approach

- We have most of the pieces for the bottom of the SpaceWire protocol stack
- We have also spent much time discussing system-level issues
  - e.g. SpW-D/R/T/RT
- This is a good time to do a top-down design of the complete stack
- This is the best way to make sure that
  - SpaceWire protocols evolve in the right way
  - Protocols are coherent
  - We have a (set of) management protocol(s) which meet the needs of the stack

Top of the Top Down

- Where do we start from?
  - i.e. What's at the top?
- There are many possible options
- Currently there is only one complete option on the table
  - CCSDS SOIS
- This should be our starting point
  - If there turn out to be problems then issues should be fed back to CCSDS

Stacking it Up

- The space between the top and the bottom then needs breaking into pieces based on system-level requirements
- This has already been done in previous presentations
  - ISAS/JAXA (especially Takahiro Yamada)
  - UoD (Steve Parkes)
- These approaches seem good
  - They are well aligned and there have been no opposing views
- Each piece needs to be well defined
  - Formal service interface description
  - Behavioural description

Putting it Together

- Only once we have the stack properly defined can we check
  - Do the pieces fit together?
  - Are the system requirements met?
  - How does information flow through the system?
  - Is an implementation feasible?

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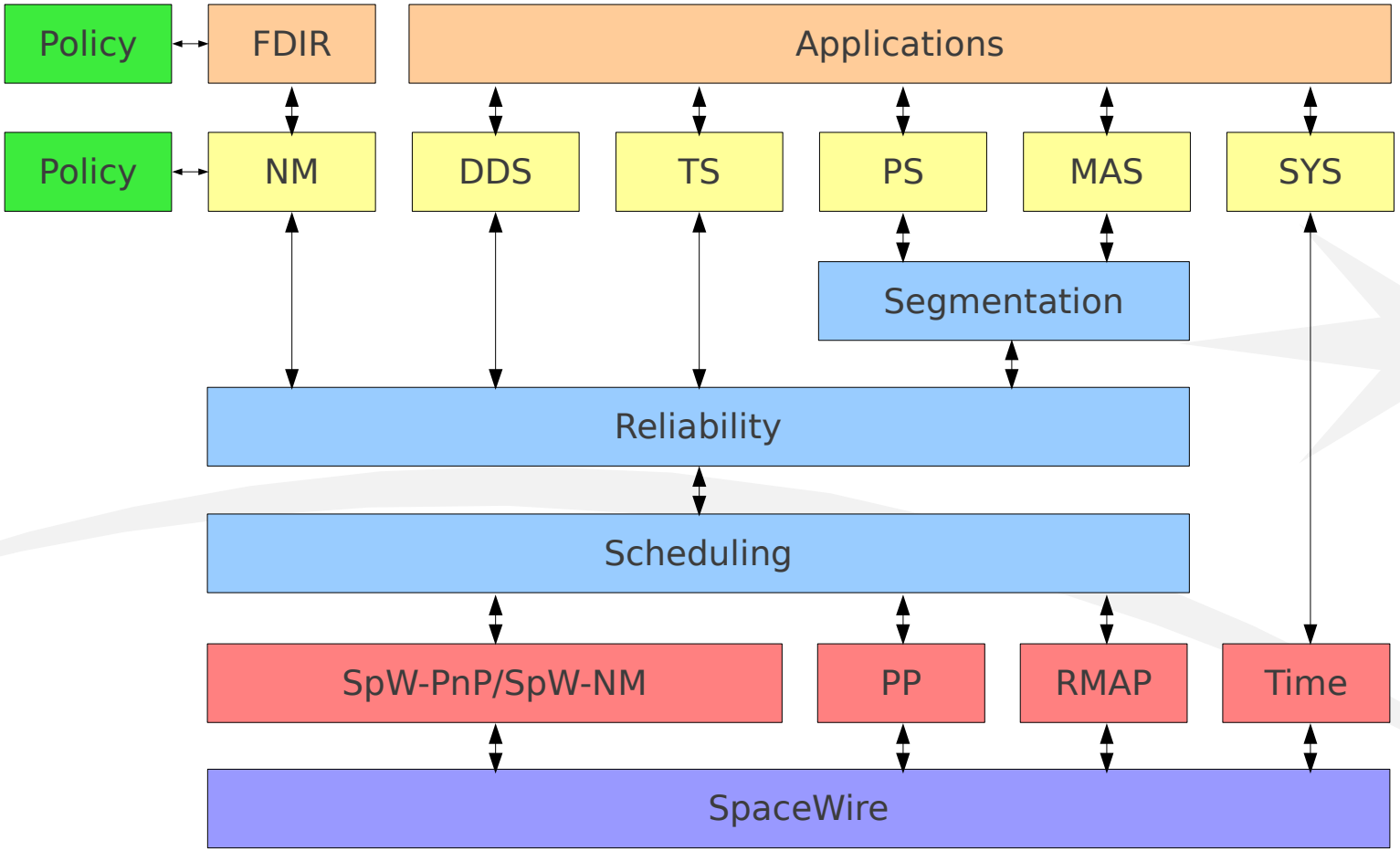
The Stack



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Stack Variations

- This stack has been drawn from implementation experience
- However, there are many variations possible
- Currently, there are many pieces missing
  - A packet protocol
  - A reliability mechanism
  - A segmentation mechanism
- Other pieces are currently being worked on
  - Scheduling
  - Time distribution
  - Network management
- There may be issues with existing pieces for completing the stack
  - RMAP

Where next?

- We need a properly defined stack
- The definition needs to be 'owned' by the community
  - Not just one or two individuals
- A properly defined stack is necessary
  - To understand network management
  - To understand how the SpaceWire stack fits into the wider system
- Also useful to show system engineers how SpaceWire can and should be used
- This issue has been cropping up repeatedly at working group meetings and conferences
- In the meantime we will need to continue working bottom up
  - Potentially creating problems for the future