The MsgWay API's*

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Outline

- Goals of MsgWay API
- Three Proposed Strata of MsgWay API's
- Resource Issues for MsgWay API's
- Comments on API's vis a vis IETF Standard
- MsgWay-based MPI
- Special Classes of Services for Realtime and Embedded Systems
- Summary/Conclusions/Future Work

Goals of MsgWay API

- Provide low-level access to
  - packet transfer
  - remote memory access (DSM)
  - primitive RPC / Active packets (PAP)
  - routing ‘options’
- Provide high speed implementations in High STN environments

MsgWay API: Multi-stratum Strategy, I.

MsgWay proposal itself is sub-IP, so we envision the stratum-1 API close to the standard

- unreliable (UDP-like, connectionless)
- low-level put/get
- low-level active packets
- unordered
- priority and preemption rules/support
- realtime issues to be considered

MsgWay API: Multi-stratum Strategy, II.

- lots of inquiry functions
- inclusive of many uses
- Does not enforce source-address (SA) usage
- Does not specify specific meanings for open fields
- Can report if underlying hardware is reliable

MsgWay API: Stratum-2 Interface, I.

- Higher-level API's also make sense, but need not be part of the MsgWay standard itself.
- RDP-like look and feel
- Reliable put/get
- Reliable primitive active packets
- Group-oriented view of servers
- Data conversion (byte swapping of payloads)

MsgWay API: Stratum-2 Interface, II.

- Primitive datatypes for DSM and packet transfer
- Standardizes memory block transfers
- Enforces source-address (SA) usage
- Primitive collective operations
- Stratum-2 is aimed at supporting:
  - MPI
  - distributed/parallel compilers

Stratum-2 Primitive collective operations

- Purpose of functionality:
  - Provide fast operations with limited semantics
  - Help separate synchronization from DSM operations
  - Must be scoped by MsgWay logical address
- Type of functionality:
  - Barrier
  - Multicast (store and forward, tree, linear)
  - Gather
- Some hardware may support directly in future

Secure MsgWay API: Stratum-3 Interface

- Builds on second-layer interface
- Provides hooks for security
- Support unencrypted headers
- Support encrypted headers with extra headers
- Stratum-3 is aimed at supporting:
  - Secure MPI (separate project)
  - other secure messaging

Resource Issues for MsgWay API's, I.

MsgWay is to provide access to SAN resources

- by capability
- by name
- QOS is an important qualifier

Resource Issues for MsgWay API's, II.

API Strata-2,3 are to accomodate registration of a group of addresses (MsgWay logical addresses) constituting a service, qualified by QOS, such as:

- speed
- accuracy/precision
- cost
- reliability
- type of encryption
- type of compression

QOS categories will not be standardized.

Comments on API's vis a vis IETF Standard

- What part, if any, of API should be part of MsgWay standard?
- What types of hooks can lower strata provide to allow pass-through of special tokens for data conversion, encryption, compression?
- How smart will MsgWay gateways be, and will any of them support special hardware, such as:
  - Data compression
  - Byte swapping
  - Encryption/decryption

MsgWay-based MPI

Hypothesis: (A) is faster than (B) in a high STN SAN environment, where classes of network errors can also be well-characterized.

(A)	(B)
MPICH	MPICH
MPI ADI	MPI ADI
MsgWay Device Driver	TCP/IP or UDP Driver
MsgWay	IP
SAN	SAN

Special Classes of Services for Realtime and Embedded Systems

- Where? Stratum-3 MsgWay API & Super MPI layers
- What?
  - Managing priority messaging
    - Discovery of priorities available
    - Management of priorities levels dynamically
  - Security
    - Per communicator at MPI layer
    - Between endpoints at MPI and/or MsgWay strata

MPI/RT Profiles are under Development

- Time-driven
  - Needs timeout mechanism
  - Predictability
- Priority
  - Needs QOS indications
  - Control of packet sizing (helps with preemptability)
  - Preemption Info/Preferences/Control

MsgWay API's will have to provide lots of environmental info.

Summary/Conclusions/Future Work

- API ideas just getting underway.
- We need an accepted computational model for these services (memory consistency model, realtime model) in addition to semantics of the packet transfers.
- Realizations of MsgWay require API's that can be used to build real demonstrations, so API's must track MsgWay standardization.
- Multiple API's possible, we suggest the 3-strata API set.