



# Shim6 Architecture

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IETF-63

August 2005



# Background

## **draft-ietf-multi6-architecture-04.txt**

(RFC publication queue)

- general description of multi-homing objectives
- consideration of major types of approaches
- consideration of various types of identity choices and their implications
- generic functional decomposition

# General Questions

- How is a session/equivalence state established?
  - Upper/lower level split
  - Initial packet exchange
  - Capability negotiation
- Re-Homing Triggers
  - Per session?
  - Per host?
- Definition of Identity Equivalence State
- Locator Selections
- Session/equivalence state removal

# SHIM6 Architecture

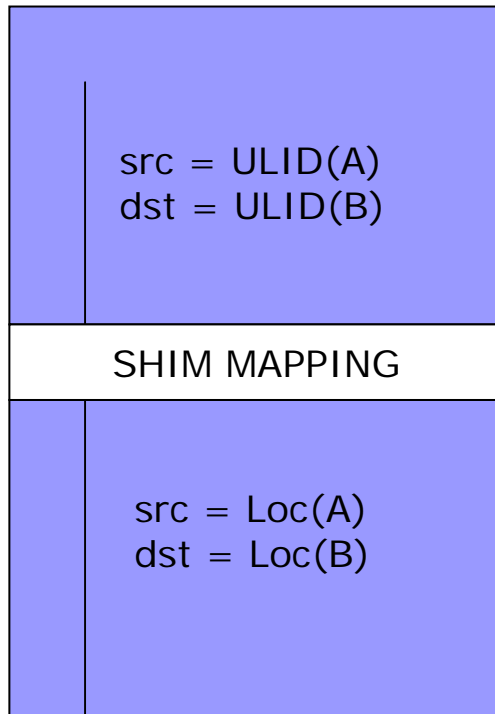
## **draft-ietf-shim6-arch-00.txt**

Initial draft – incomplete

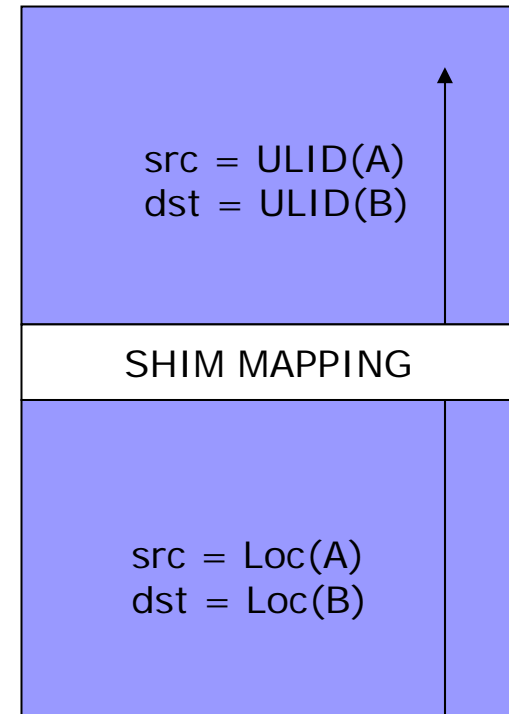
- Endpoint Identity considerations
- Functional decomposition
  
- To Add (?)
  - Equivalence State definition
  - Design Trade-offs

# SHIM6 ID / LOC Split - Basic Approach

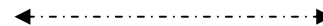
Sender A



Receiver B



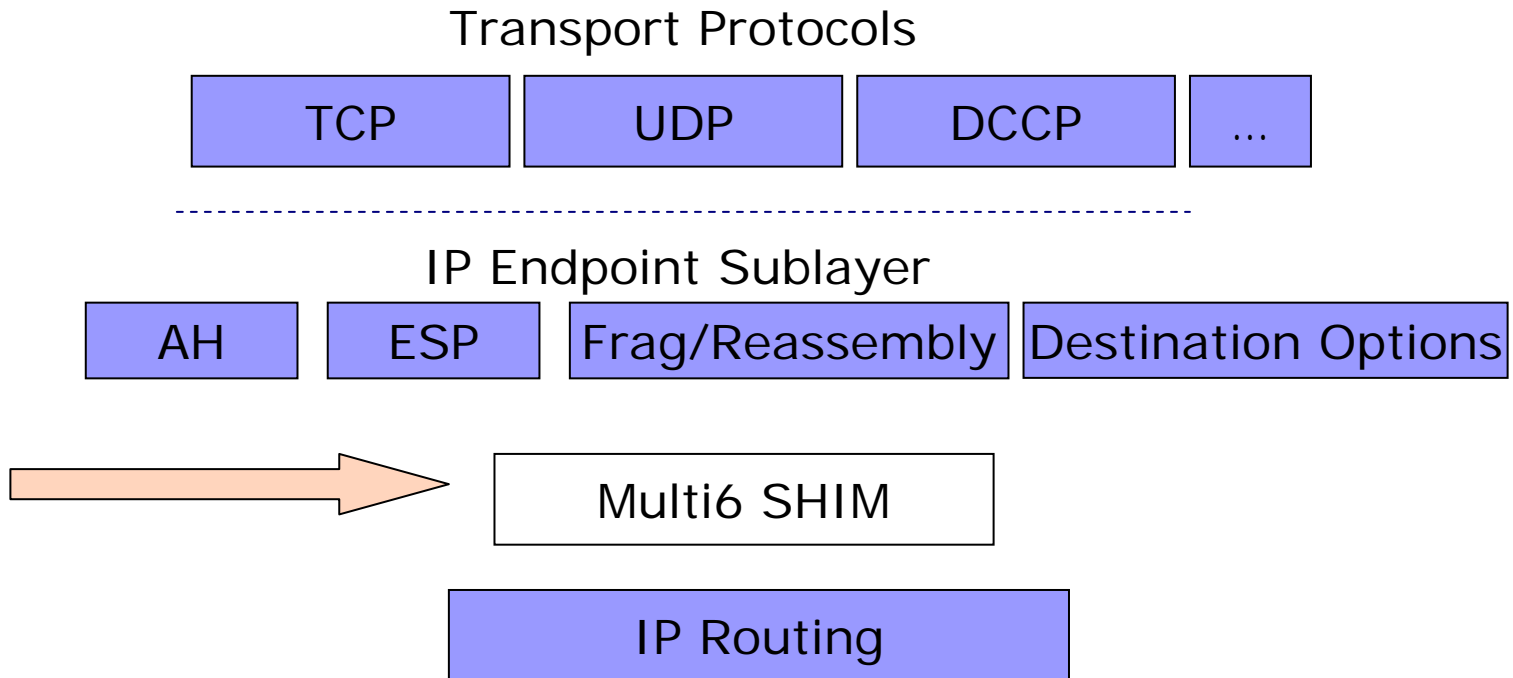
Identity



Locator



# Where is the SHIM?



# What's a "ULID"?

## ■ Upper Layer Identifier

- A selection from the set of locators associated with an endpoint
  - It's (probably) a viable locator
  - It's drawn from a structured space (reverse mappable)
  - Its better if it were a unique (deterministic) selection for each host *(to be clarified)*
  - Its useable in a referral context within and between hosts
  - Its semi-persistent

# Turning on SHIM6

- The initial SHIM6 state for a ULID pair is the null mapping function
  - (no shim mapping and no locator equivalence set)
- Subsequent capability negotiation to determine host-paired SHIM6 capability
- Exchange of current Locator Sets
- SHIM mapping installed on each endpoint at the IP layer
  - ULID pair to current Locator pair



# Maintaining State

## ■ Detecting network failure

*(How does a host know that its time to use a different source and/or destination locator?)*

*(More work needed here)*

- Single per-endpoint state vs per session state
- Heartbeat within the session
- Shim heartbeat
- Modified transport protocol to trigger locator change
- Host / Router interaction to trigger locator change
- Application timeframe vs network timeframe
- Failure during session startup and failure following session establishment

# Maintaining State

## ■ Locator Failure Triggers

- Possible triggers include failure of upper level keepalive signal to the SHIM layer, explicit trigger from upper level, ICMP error, explicit SHIM level reachability failure
  - Any or defined subset?
- Re-Homing may involve exhaustive pair exploration to establish a new viable locator pair
  - Reactive or Continuous Probe?
- Signal upper level protocol of path state change
  - “Active” end state change procedure
  - “Passive” end state change procedure

# Removing State

- No explicit upper level protocol trigger
  - Use state timeout to remove stale SHIM mapping information

(The entire area of vertical signalling in the host protocol stack requires further consideration)

# Some Open Issues

- Integration of use of HBAs and CGAs with SHIM6
  - In particular dynamic vs static locator set management
- SHIM6 capability negotiation and locator set exchange
  - Protocol analysis required
- Explicit packet signals for triggering SHIM mapping on incoming packets
  - How should you tell an incoming SHIM packet vs a non-SHIM packet?
- Interaction with site exit routers
  - Not defined as yet

# Open Issues (2)

- ULID selection
  - How deterministic should this be?
- DNS interaction
- Adds and Wdls from locator pool
- Per-transport locator failure triggers
  - i.e. per transport vs per ULID pair SHIM state?

# Common Issues

- Network layer protocol element
  - How do you know a session is completed?
    - The concept of session establishment and teardown is a transport concept, not an IP level concept
  - What do you need to do to bootstrap?
    - Are there 'distinguished' locators that you always need to use to get a session up?

# Common Issues

## ■ Session Persistence

- Use one locator as the “home” locator and encapsulate the packet with alternative locators
- Set up the session with a set of locators and have transport protocol maintain the session across the locator set
  - Optionally delay the locator binding, or allow the peer dynamic change of the locator pool
- Use a new peering based on an identity protocol element and allow locators to be associated with the session identity

# Common Issues

- Identity / Locator Binding domain (Equivalence Set)
  - Is the binding maintained per session?
    - In which case multiple sessions with the same endpoints need to maintain parallel bindings
  - Is the binding shared across sessions?
    - In which case how do you know when to discard a binding set?



# Common Issues

- Bilateral peer applications vs multi-party applications
  - What changes for 3 or more parties to a protocol exchange?
- Application hand-over and referral
  - How does the remote party identify the multi-homed party for third party referrals?



# Next Steps

- Review SHIM6 contributions
- Solicit explicit answers to open issues from document editors
- Submit -01 draft for WG Review