



Location Management in Wireless ATM

--- The ATM Forum's View ---

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Location Management in Wireless ATM

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- Overview of Location Management in Wireless ATM
- The mobile-PNNI Scheme Approach
- The Location Register Scheme Approach
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- Summary

Introduction

“Wireless” does not mean “Mobility”

- Wired vs. Wireless
- Fixed vs. Mobile

General Requirements for Support of Mobile Terminals

- Call setup by utilizing unique, non-changing ID
- MT being “mobile” should be invisible for interlocutor

Location Management in WATM (overview)

Location Management in WATM (overview)

What comprises Location Management?

- Location Registration
- Location Update
- Location Tracking

Location Management in WATM (overview)

Location Management Requirements

- Roaming
- (Globally Unique) Network Identification
- Minimal Signaling Load
- Scalability

Location Management in WATM (overview)

Location Management Functionalities

- Deriving directly from LM Requirements
- MT must recognize POA:
 - > MT can “see” if it is located in its home or foreign (visiting) network
- Assignment of Temporary Address (TA) to allow Routing to MT
- Propagate Reachability Information

The mobile-PNNI Scheme Approach

The mobile-PNNI Scheme Approach

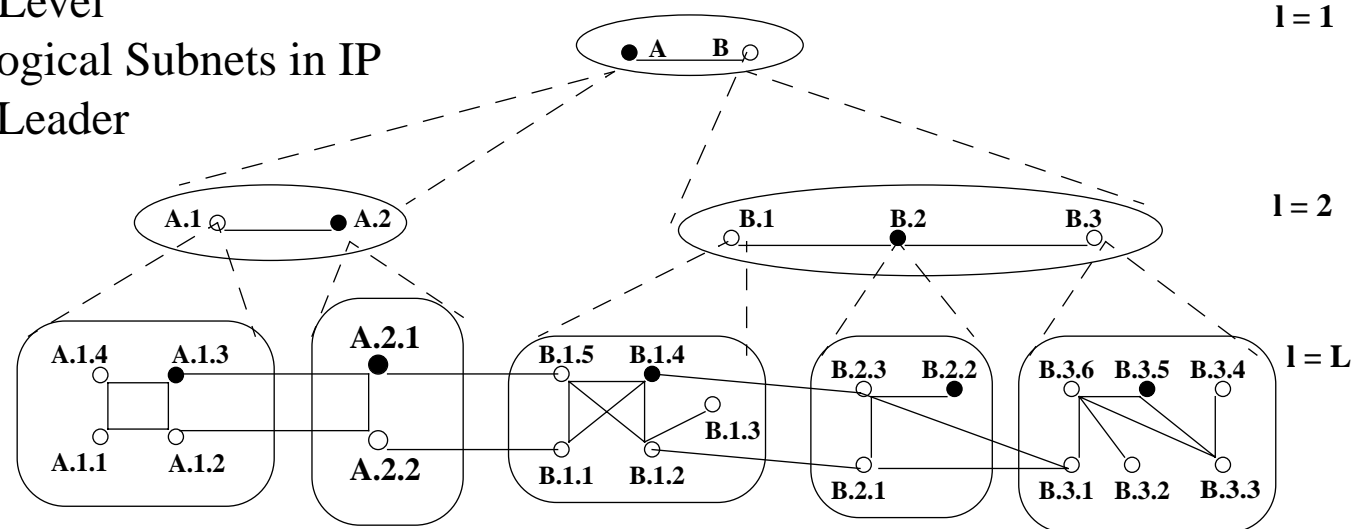
How does PNNI comprise Reachability Information?

- What is a Peer Group?

Hierarchical Level

Similar to Logical Subnets in IP

Peer Group Leader



- Summarization and Flooding of Reachability Information

The mobile-PNNI Scheme Approach

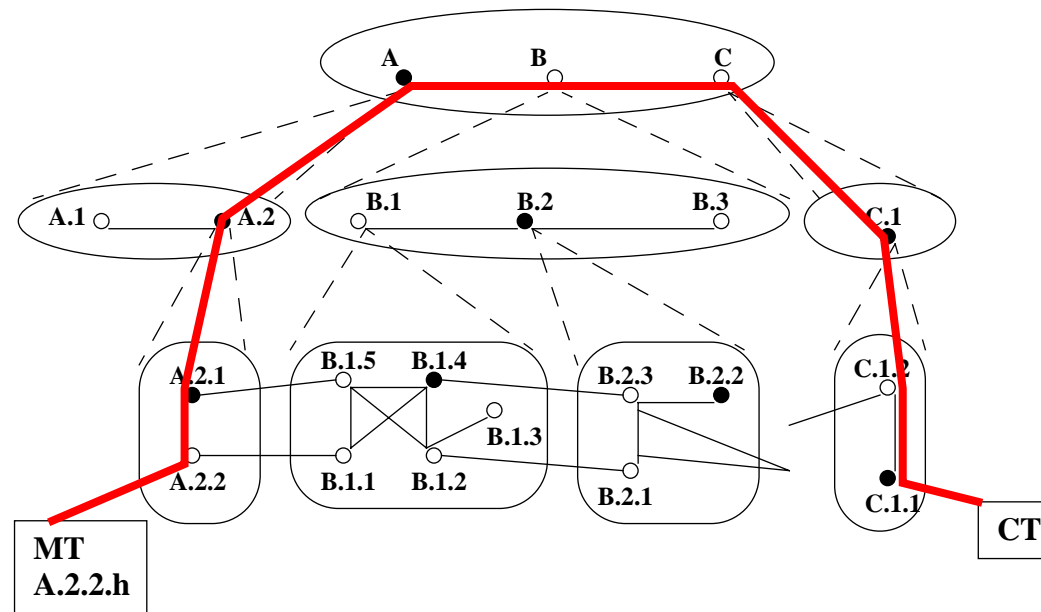
Accompanying a MT in a mobile-PNNI Scheme based network

- Mobile located in Home Network
- Mobile Moves (Registers) in Foreign (Visiting) Network
- Calling Terminal within Scope of Mobile
- Calling Terminal out of Scope of Mobile

The mobile-PNNI Scheme Approach

Mobile located in Home Network

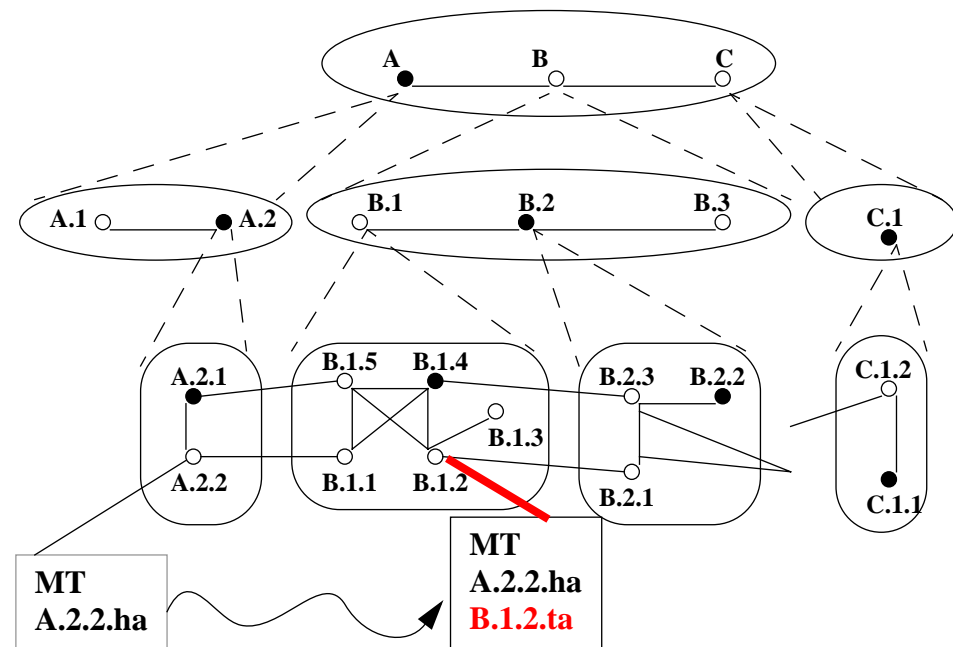
- The same as if mobile were a “fixed” terminal



The mobile-PNNI Scheme Approach

Mobile Moves (Registers) in Foreign (Visiting) Network

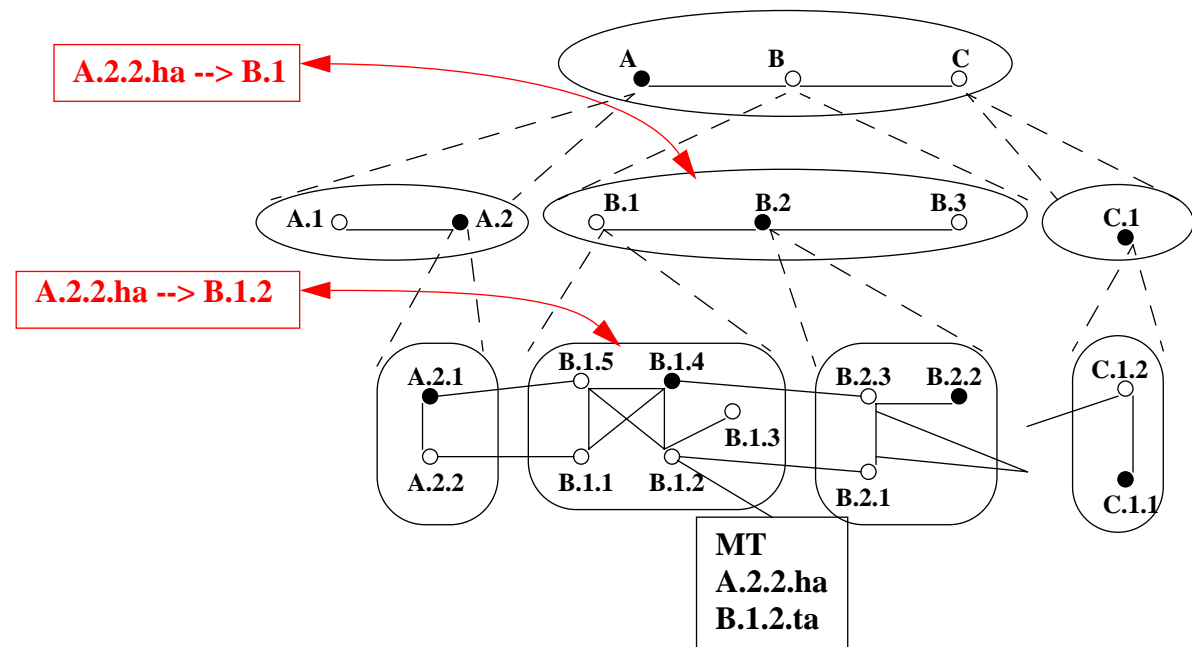
- Register with peer group, i.e. assigning a temporary address (TA) to MT



The mobile-PNNI Scheme Approach

Mobile Moves (Registers) in Foreign (Visiting) Network

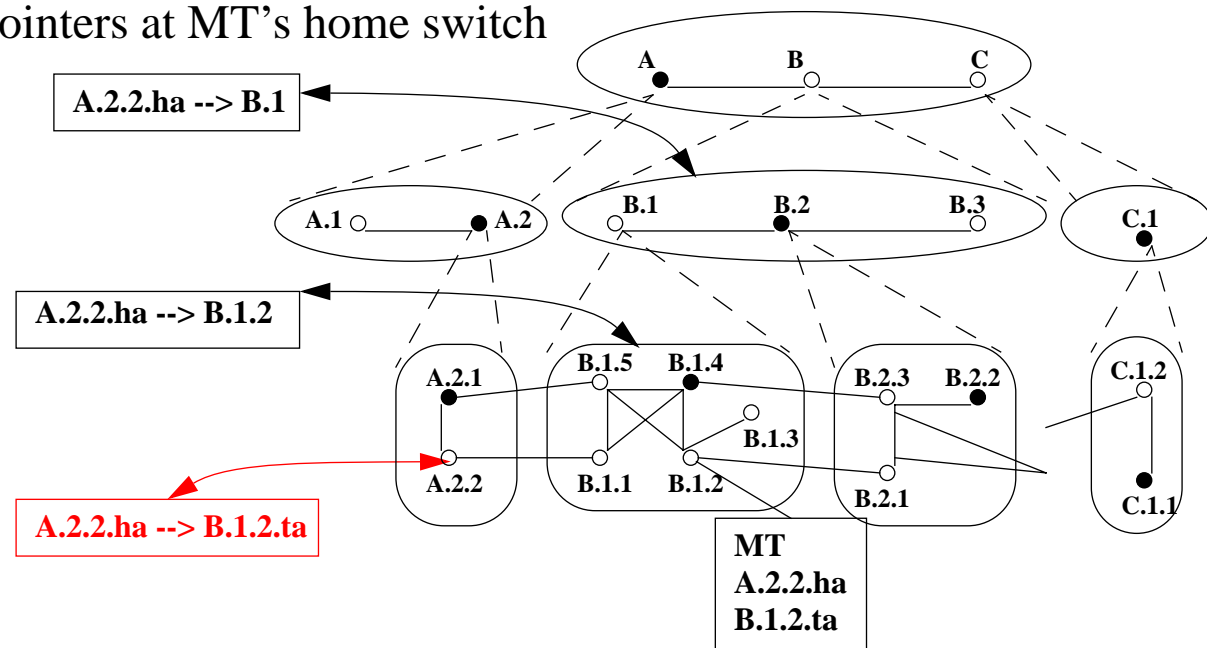
- Register with peer group, i.e. assigning a temporary address (TA) to MT
- Propagate reachability Information to the net, i.e. mapping of home address (HA) and TA



The mobile-PNNI Scheme Approach

Mobile Moves (Registers) in Foreign (Visiting) Network

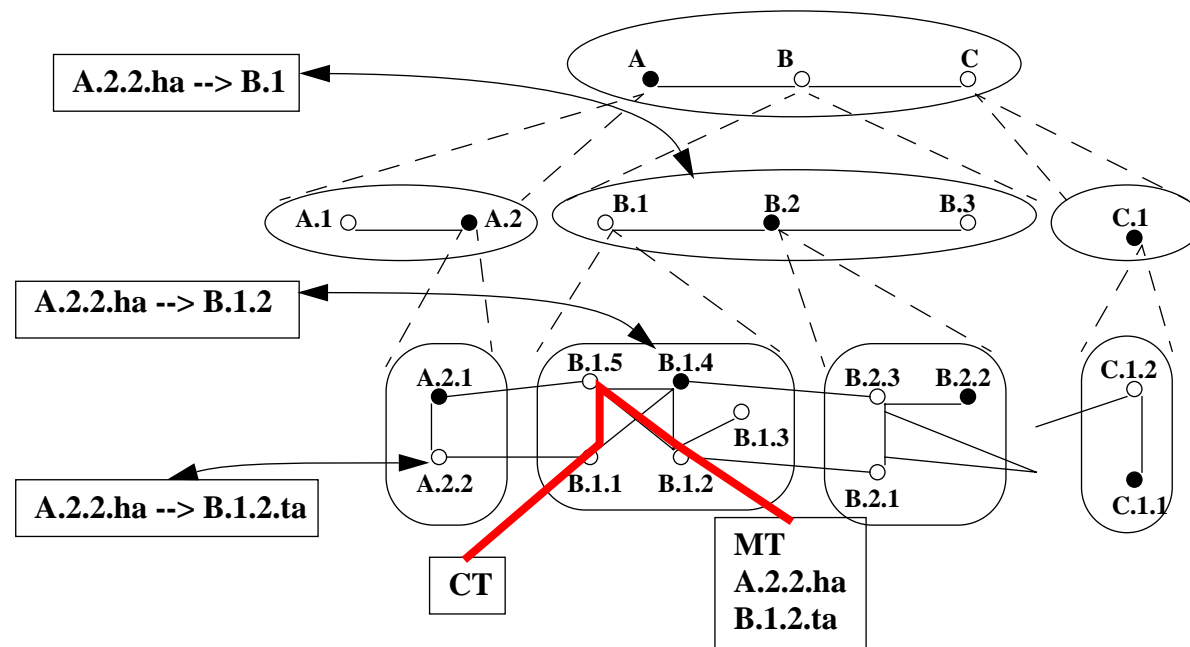
- Register with peer group, i.e. assigning a temporary address (TA) to MT
- Propagate reachability Information to the net, i.e. mapping of home address (HA) and TA
- Set forwarding pointers at MT's home switch



The mobile-PNNI Scheme Approach

Calling Terminal within Scope of Mobile

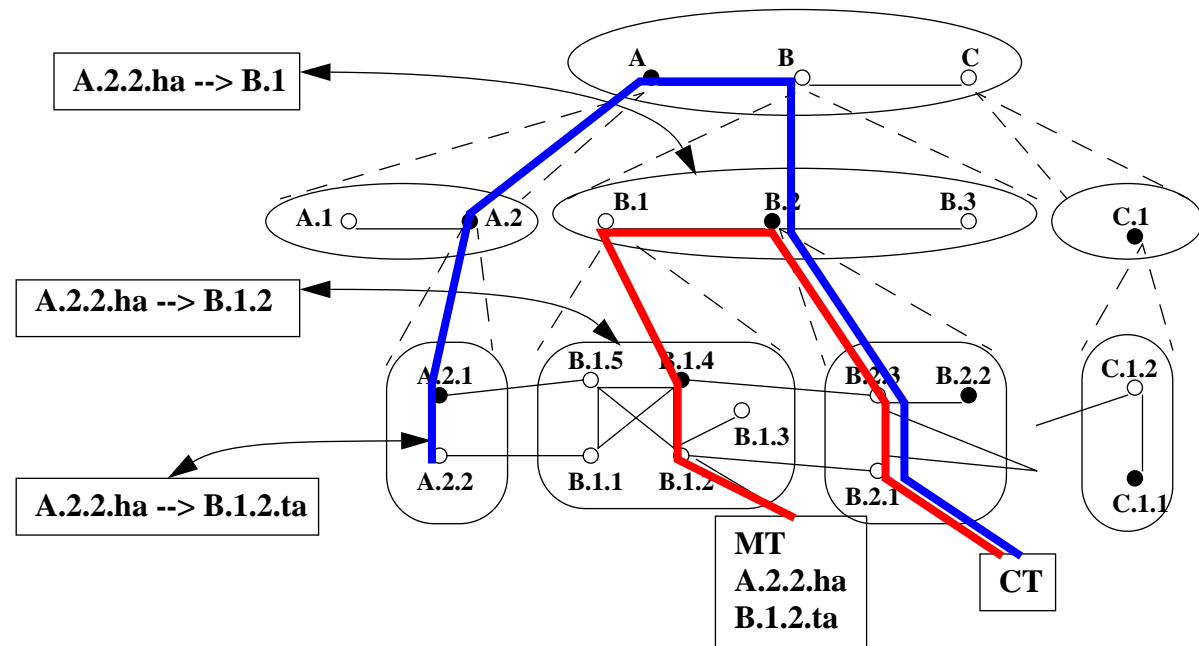
- Direct setup from calling terminal (CT) to MT
- Always shortest path, as neighborhood “knows” about MT’s current position



The mobile-PNNI Scheme Approach

Calling Terminal out of Scope of Mobile

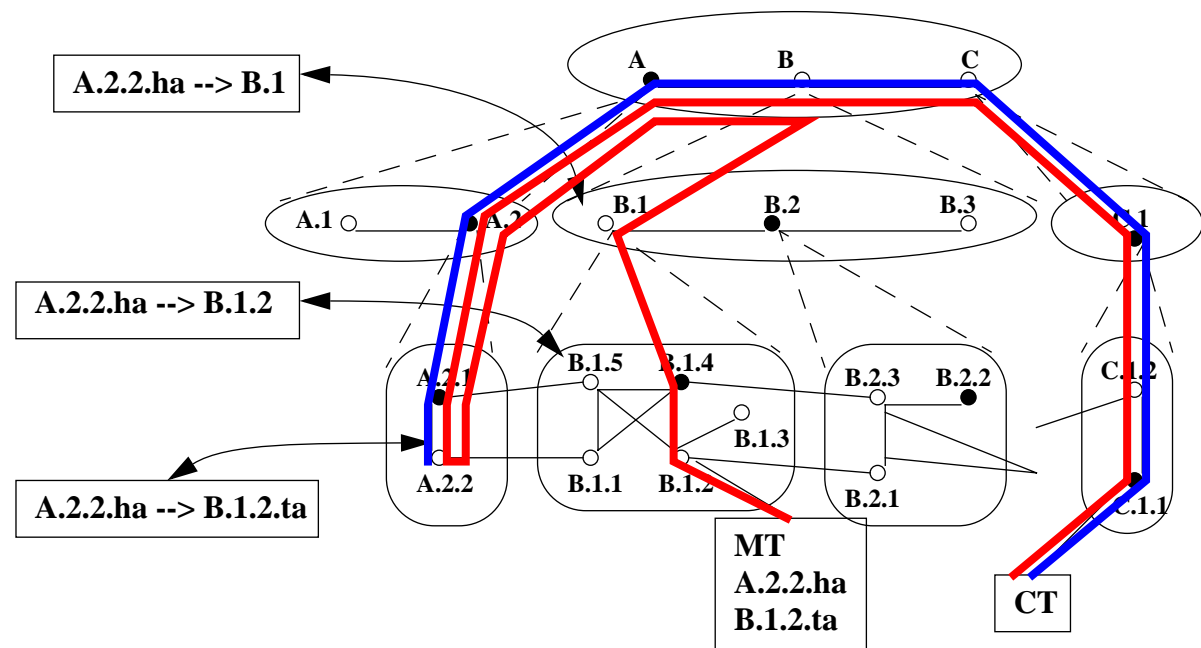
- Initial call setup to MT's home switch
- Setup path may cross a level, where reachability information is available



The mobile-PNNI Scheme Approach

Calling Terminal out of Scope of Mobile

- Initial call setup to MT's home switch
- Setup path may cross a level, where reachability information is available
- No reachability information available on setup path



The mobile-PNNI Scheme Approach

Advantages of the mobile-PNNI Scheme

- Current PNNI does already allow exchange of reachability information
- No explicit location phase for MTs
Information about MT's current location integrated in the network's routing information
- Keep current address space (i.e. no separation to define a terminal to be mobile by its distinguishable ATM address)

Negative Aspects of mobile-PNNI Scheme

- Change / enhancement of current PNNI needed

The Location Register Scheme Approach

The Location Register Scheme Approach

What comprises a Location Register?

- Track mobiles within their peer group
- Basically a database storing information on MT's POA
- Can be hierarchically organized

The Location Register Scheme Approach

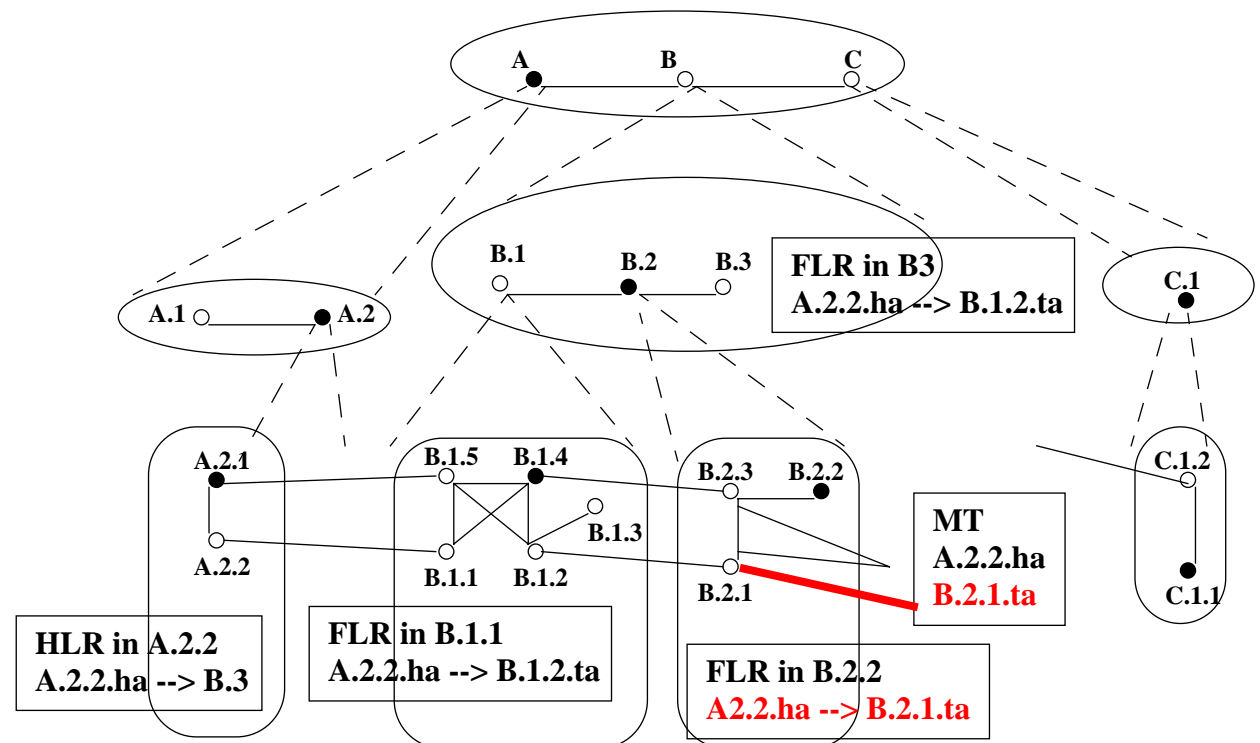
Accompanying a MT in a LR Scheme based network

- Mobile Moves (Registers) in Foreign (Visiting) Network
- Call-Setup to MT
- Mobile located in Home Network

The Location Register Scheme Approach

Mobile Moves (Registers) in Foreign (Visiting) Network

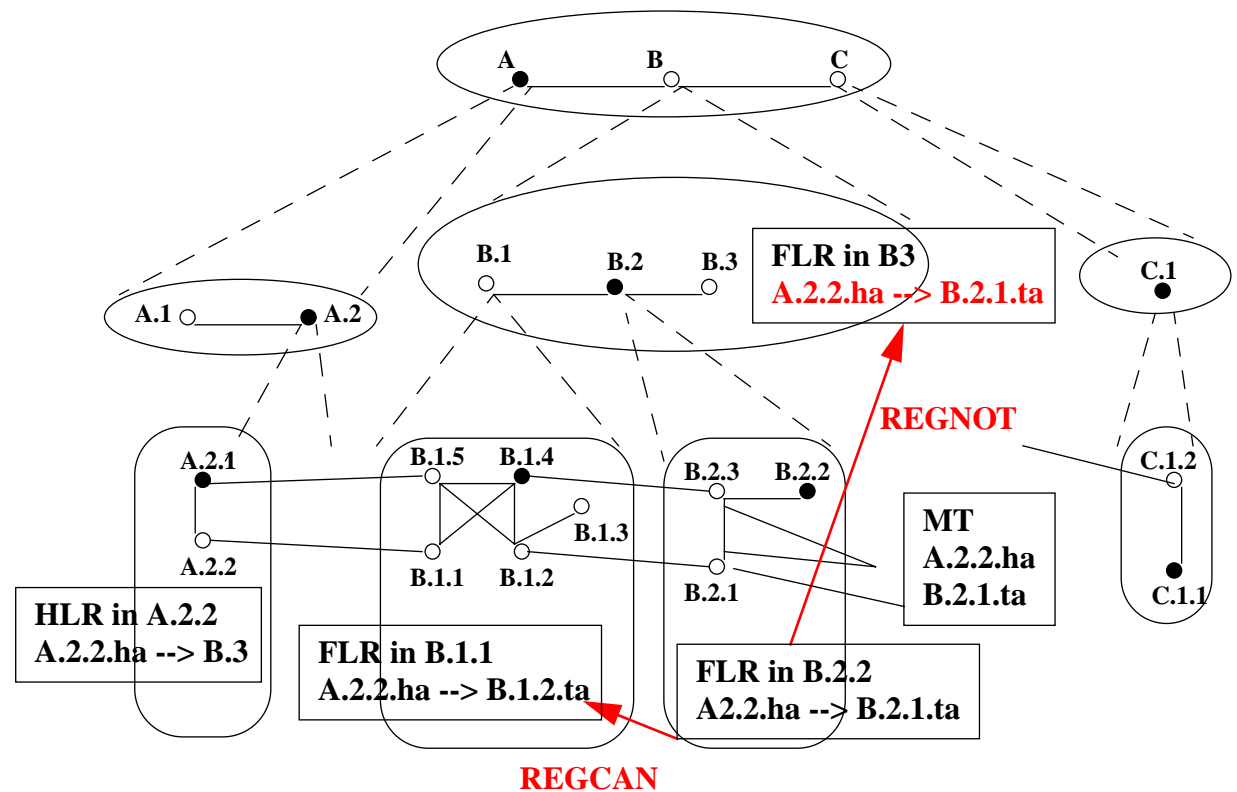
- Register within peer group, i.e. assigning TA to MT by foreign location register (FLR)



The Location Register Scheme Approach

Mobile Moves (Registers) in Foreign (Visiting) Network

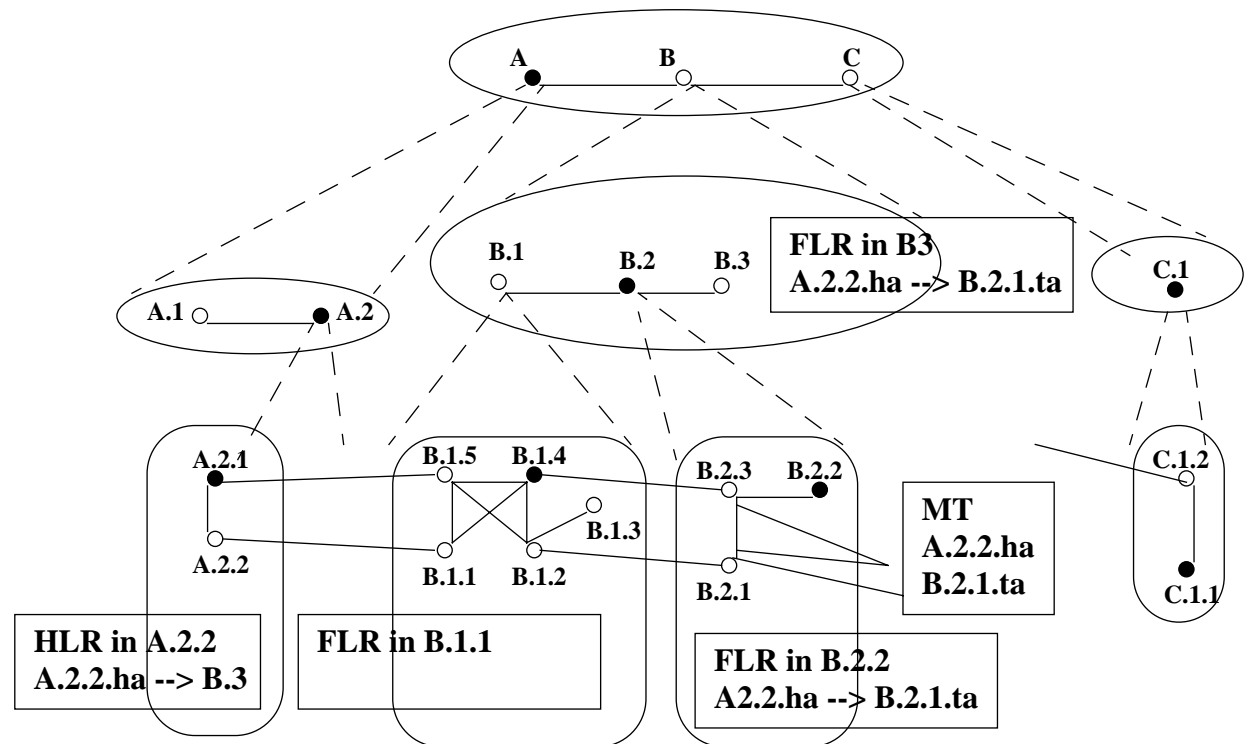
- Register within peer group, i.e. assigning TA to MT by foreign location register (FLR)
- Send REGNOT upward to LR i.e. common ancestor
- Send REGCAN to MT's originating LR



The Location Register Scheme Approach

Mobile Moves (Registers) in Foreign (Visiting) Network

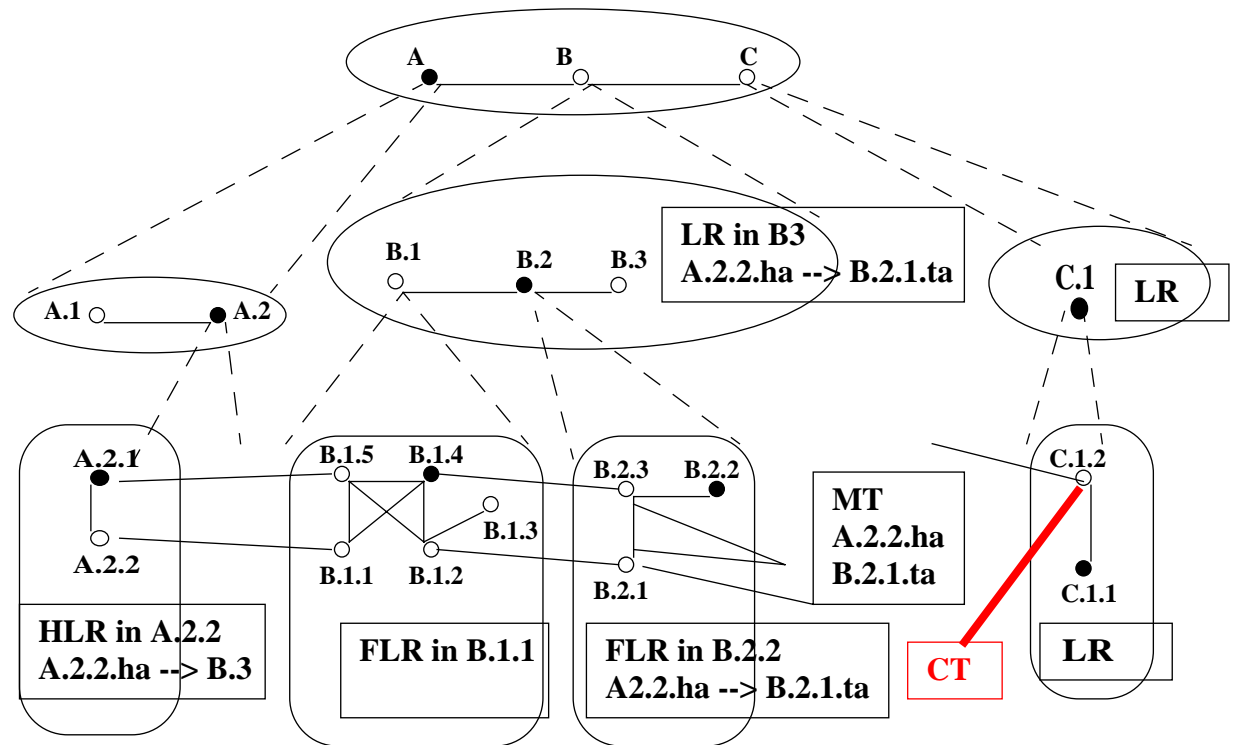
- Register within peer group, i.e. assigning TA to MT by foreign location register (FLR)
- Send REGNOT upward to LR i.e. common ancestor
- Send REGCAN to MT's originating LR
- HLR tracks MT's current position by upper most level of FLRs



The Location Register Scheme Approach

Call-Setup to MT

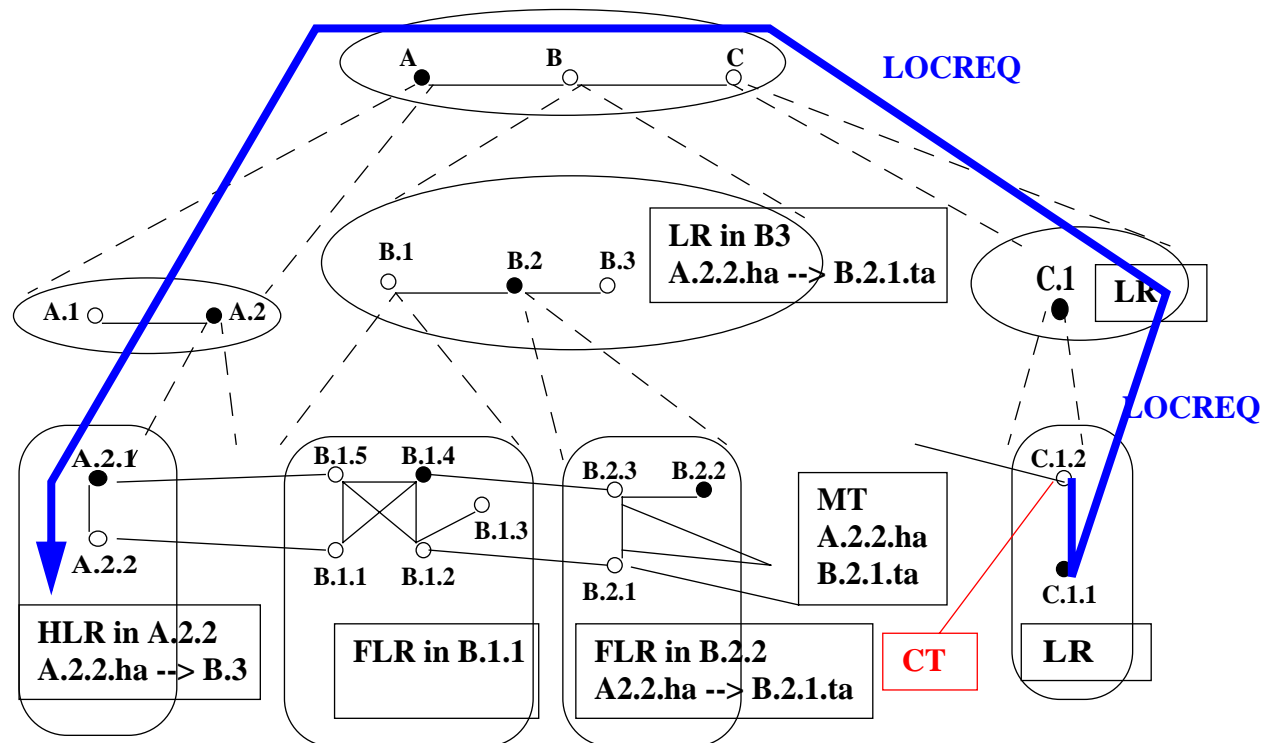
- Home Switch of CT recognizes MT's address to be mobile
 --> Start location phase



The Location Register Scheme Approach

Call-Setup to MT

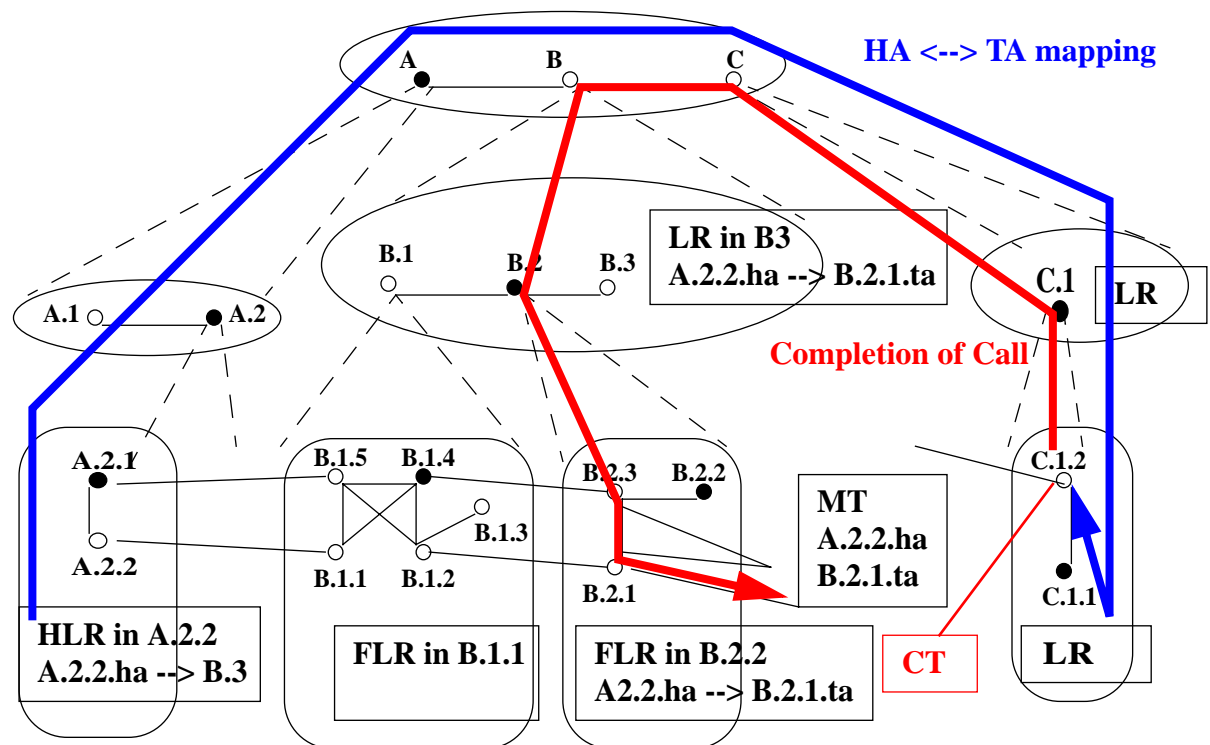
- Home Switch of CT recognizes MT's address to be mobile
- Send location request to LR in calling network
- LR in calling network may prompt upper level LR or HLR



The Location Register Scheme Approach

Call-Setup to MT

- Home Switch of CT recognizes MT's address to be mobile
- Send location request to LR in calling network
- LR in calling network may prompt upper level LR or HLR
- TA <--> HA mapping reaches LR in calling network
- Home switch of CT can directly set-up call



The Location Register Scheme Approach

Mobile located in Home Network

- Almost same as if mobile were a “fixed” terminal
 - > Its home location register (HLR) “knows”
- Attention: Still a prior location phase:
 - > Same procedure as if located in foreign network

The Location Register Scheme Approach

Advantages of the LR Scheme

- Isolates effect on PNNI for mobility support
- Can be placed within peer group structure

Negative Aspects of LR Scheme

- Explicit mobile location phase prior to call-setup
- Address space separation needed

Route Optimization

- Necessary in order to avoid wasting network resources
- Not primarily subject of Location Management
- Three approaches:
Forwarding
--> worst case

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- Not primarily subject of Location Management
- Three approaches:

Forwarding

--> worst case

Complete Release

--> best, but long setup delay

--> corresponds to setup in LR scheme

Route Optimization

- Necessary in order to avoid wasting network resources
- Not primarily subject of Location Management
- Three approaches:

Forwarding

--> worst case

Complete Release

--> best, but long setup delay

--> corresponds to setup in LR scheme

Partial Release

--> Similar to complete release

--> BUT: not up to CT's home switch

Summary

Summary

mobile-PNNI Scheme

- Location information integrated in routing information
--> low set-up delay
- New (enhanced) version of PNNI needed
- No change in address space

LR Scheme

- Explicit (prior) localization phase
--> high set-up delay
- LM functionalities in separate entities
--> no effect on PNNI
- Division of address space into “mobile” and “fixed” addresses

Appendix

Appendix

Abbreviations

CT	Calling Terminal
FLR	Foreign Location Register
HA	Home Address
HLR	Home Location Register
LM	Location Management
LR	Location Register
MT	Mobile Terminal
POA	Point Of Attachment
REGCAN	Registration Chancel
REGNOT	Registration Notification
TA	Temporary Address
WATM	Wireless ATM

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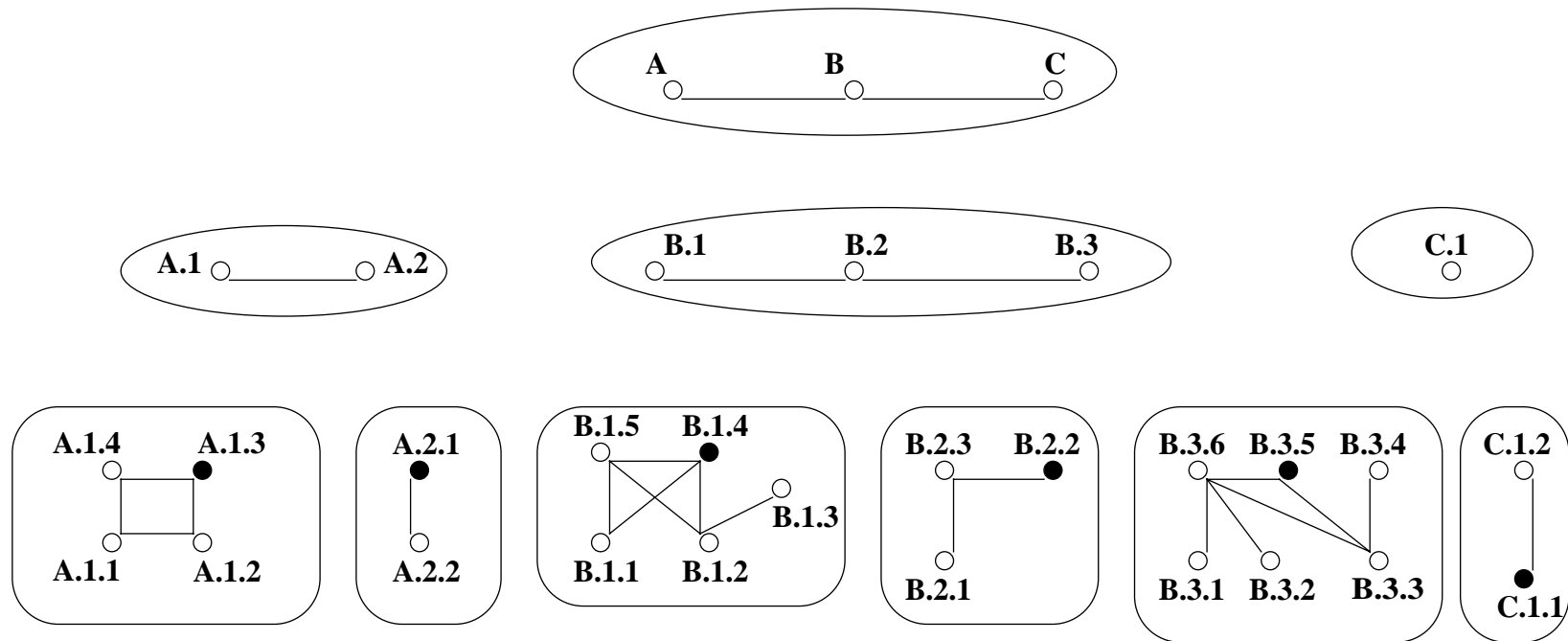
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PNNI-Based Hierarchical ATM Network I



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