Further Exploration of Transactions and Name Spaces

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Revision 1
(Modified short version of 93/22 as a result of work during March 1993 MAC group meeting.)

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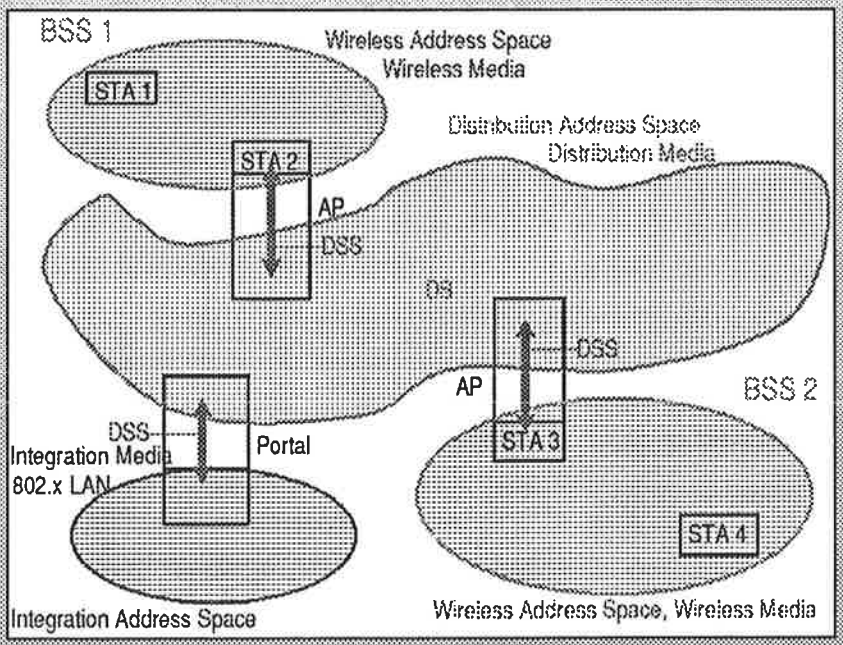
Address Space / Media Boundaries



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Three Potentially Different Name Spaces and Media

- Wireless Medium (WM).
- Wireless Address Space (WAS).

- Distribution Medium (DM).
- Distribution Address Space (DAS).

- Integrated Medium (IM).
- Integration Address Space (IAS).

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Name Space Notation

- "Addresses" are tuples
  - The value of the address
  - The type of the space the address belongs to
    - » WAS, DAS, IAS
- This the notation used for a tuple:
  - [name space ID, address within the name space]

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Objects And The Spaces They Live In

- Mobile Stations
  - Wireless address space
  - STA_Name = [WAS, station id]
- APs
  - Wireless address space
  - Distribution address space
  - AP_Name = [WAS, AP id] or [DAS, AP id]
- Portals
  - Distribution address space
  - Integrated address space
  - Portal_Name = [DAS, portal id] or [IAS, portal id]
- Integrated LAN nodes
  - Integrated address space
  - IAS_Name = [IAS, IAS address]

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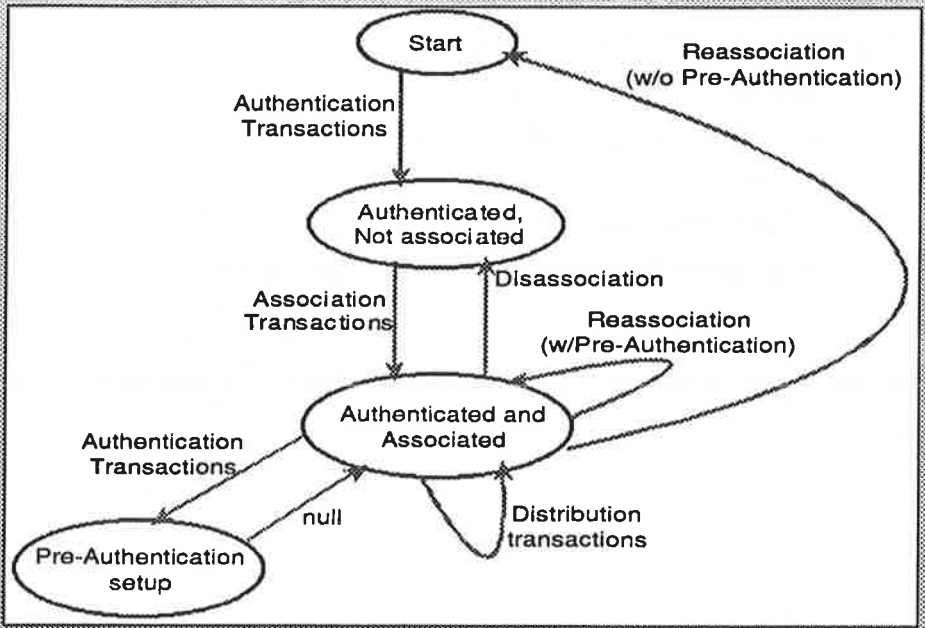
Station States & Transaction Relationships



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Distribution Transactions

- STA 1 sends a msg...
- We must distinguish between the concepts of "intended destination of the message" and "how it gets it there".
- Example: Consider STA 1 (within the WAS) sending a msg to STA 4 (also within the WAS).

Distribution Transactions

- Information needed within a message:
  - Msg_Origin:
    - » Allows destination to know how to respond to the msg.
    - » [name space ID, address within the name space]
    - » ex: [WAS, STA 1]
  - Msg_Destination:
    - » Identifies intended recipient of the msg.
    - » [name space ID, address within the name space]
    - » ex: [WAS, STA 4]

Distribution Transactions

- BSS case:
  - Both the destination and the address are members of the WAS.
- ESS case:
  - The msg is sent (addressed within the WAS) to an AP.
  - The intended destination of the msg is not (usually) the AP itself.
  - The intended recipient is a member of either the WAS or the IAS.

Distribution Transactions

- Msg sent by a mobile STA received by an AP...
- Is this AP the intended destination of the message?
  - i.e. Msg_Destination equal to WAS_name(the receiving AP) ?
  - Yes, the AP is the final destination for the msg.
  - No, give the msg to the DS.
  - ex: Msg_Destination = [WAS, STA 4] and WAS_Address(AP 1) = [WAS, AP 1] so the AP is not the final destination.

Distribution Transactions

- Msg given by AP to DS...
- DS figures out how to handle the msg...
- DS uses Association Service information to determine DS_Destination(Msg_Destination).
  - ex: DS_Destination([WAS, STA 4]) = [DAS, AP 2]
- Distribute(Msg, "DS output")
  - ex: Distribute(Msg, [DAS, AP 2])
- DS delivers msg to the desired "output" of the DS.
  - This could be either an AP or a Portal.

Distribution Transactions

- AP receives a msg from the DS...
- Check to see if msg destination is associated with this AP.
  - i.e. is DS_Destination(Msg_Destination) = DS_Address(this AP) ?
  - ex: DS_Destination ([WAS, STA 4]) = [DAS, AP 2] and DS_Address(AP 2) = [DAS, AP 2] so the destination is associated with this AP.
  - Yes: This AP is associated with the desired destination.
    - » Msg transmitted on the WM (by the AP) for the intended recipient to receive.
  - No: There is an error condition to recover from.
    - » Note: Some DS implementations may try harder to deliver the msg (before giving up) than others - this is a detail of the DS implementation and outside our concern.

Association Transaction Sequence

- Already authenticated with desired AP?
  - yes - go ahead.
  - no - invoke authentication service.
- Privacy level set up?
  - yes - go ahead.
  - no - invoke privacy service.
- Set up the association.
  - Set DS_Destination(STA_name) to DAS_name(AP_name)
  - STA state becomes Associated.

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Disassociation Transaction Sequence

- Disassociate(STA_name)
- Set DS_Destination(STA_name) to NULL
- Resets Station State to Unassociated.
- No impact on Authenticated state.

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Reassociation Service Transactions

- Reassociate (STA_name, Old_AP_name, New_AP_name)
  - STA_name in WAS.
  - AP_names both in WAS.
  - Results in an invocation of Set_DS_Destination(STA_name, New_AP_name)
  - Old_AP_name present for convenience:
    - » Nice for "Wide" AP implementations, facilities easy notification to old AP.
    - » Handy if STA initiates reassociation.
      - Avoids any need for the new AP having to find out who the old AP is.

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Summary

- Information within a message:
  - Msg_Origin
  - Msg_Destination
- Names are tuples
  - The value of the address
  - The type of the space the address belongs to
    - » WAS, DAS, IAS
- Notation for a tuple:
  - [name space ID, address within the name space]

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Summary

- Name space translations:
  - DAS_name(AP_name)
    - » returns a DAS name: [DAS, DAS address]
  - WAS_name(AP_name)
    - » returns a WAS name: [WAS, WAS address]
  - IAS_name(Portal_name)
    - » returns an IAS name: [IAS, IAS address]
  - DAS_name(Portal_name)
    - » returns an IAS name: [IAS, IAS address]
- Names:
  - AP_Name = [WAS, AP id] or [DAS, AP id]
  - Portal_Name = [DAS, portal id] or [IAS, portal id]
  - IAS_Name = [IAS, IAS address]
  - STA_Name = [WAS, station id]

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Summary

- Functions:
- DS_Destination(name tuple)
  - Inputs in either a WAS or IAS name space.
  - Returns name in DAS.
- Set_DS_Destination(STA_name, AP_name)
  - STA_name and AP_name input as WAS names.
- Disassociate(STA_name)
  - STA_name input in WAS.
- Reassociate (STA_name, Old_AP_name, New_AP_name)
  - All inputs in WAS
- Distribute(Msg, "DS output")
  - Msg is the msg to distribute
  - DS_output is name of an AP or Portal (in DAS)

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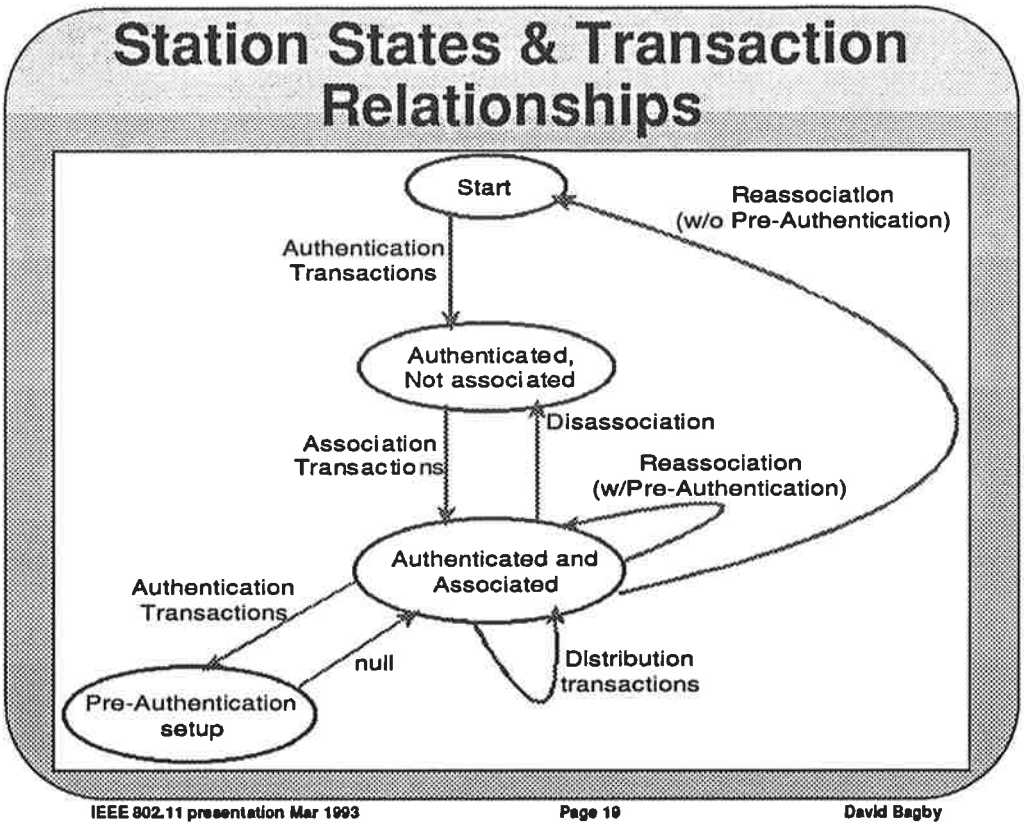
Station States & Transaction Relationships
Start
Reassociation (w/o Pre-Authentication)
Authentication Transactions
Authenticated, Not associated
Disassociation
Association Transactions
Reassociation (w/Pre-Authentication)
Authenticated and Associated
Authentication Transactions
null
Distribution transactions
Pre-Authentication setup
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