# Interplanetary Multi-Destination Communication

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- Background
  - Interplanetary Multi-Destination Communication(IMC) is a method for allowing bundles to be transported to multiple destinations without creating a duplicate for every destination. This method borrows a few concepts from traditional IP multicast, but is inherently a distinctly separate mechanism.
  - This mechanism is a derivation of the draft-burleigh-dtnrg-imc-00 CBHE-Compatible Bundle Multicast
  - As defined in the CCSDS Orange Book we are restricting the current standardization to the Universal Resource Identifier (URI) scheme as well as rules for basic routing. This is because there needs to be more work completed on efficient routing algorithms.
  - This basic standard may also allow for backwards compatibility with future IMC standards as even if an implementation of DTN is unable to support the more efficient routing methodology the basic standard can be used to provide pass through capabilities.

- IMC Scheme
  - The IMC scheme supports the identification of BP endpoints by pairs of unsigned integers, for the identification of endpoints that represent multiple destinations. IMC uses the Augmented Backus-Naur Form (ABNF) notation and the core ABNF syntax rule for DIGIT defined by RFC5234 . All bundle protocol endpoints identified by imc scheme endpoint IDs are non-singleton endpoints.

| Scheme | Syntax |
|---|---|
| imc-uri | “imc:” imc-hier-part |
| imc-hier-part | group-id id-delim service-id |
| group-id | 1*DIGIT |
| id-delim | “.” |
| service-id | 1*DIGIT |

- IMC Rules
  - Forwarding
    - The term IMC group has been created to capture the fact that IMC addresses are shared destinations.
    - When an application requests bundle transmission of an application data unit to an IMC group, the node shall create the bundle (as prescribed by the RFC9171 specification) and:
      - Deliver the bundle locally, if the node is itself a member of that IMC group.
      - Forward a copy of the bundle to every immediate neighbor with a configured forwarding rule associated with the IMC group.
    - When an IMC-capable node receives a bundle whose destination is an IMC group, the node shall:
      - Deliver the bundle locally, if the node is itself a member of that IMC group.
      - Forward a copy of the bundle to every immediate neighbor with a configured forwarding rule associated with the IMC group, except the relative from which the bundle was received.

- IMC Rules Continued
  - Duplicate Suppression
    - A consequence of using IMC is the potential to have bundles forwarded endlessly in a loop around a DTN network. This is known as an IMC storm and is defeated using duplicate suppression. It does this by keeping track of bundles that it has received and not forwarding bundles that is has already forwarded once before.