Multicast Scope Zone Announcement Protocol (MZAP)

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Problems with Admin Scoping

Applications need a mechanism to discover the scope zones that are relevant for their location.

Admin scope zones are easy to misconfigure:

- Leaks are common
- Non-convex scope zones are common

The goal of MZAP is to solve all three of these problems.

Bootstrapping

We cannot build a mechanism to discover a scope zone exists by sending messages to addresses in that scope.

- Need to know which address to listen on.

We can only *assume* two zones exist:

- global
- local (239.255.0.0/16)

Hence any bootstrap mechanism must use local scope.

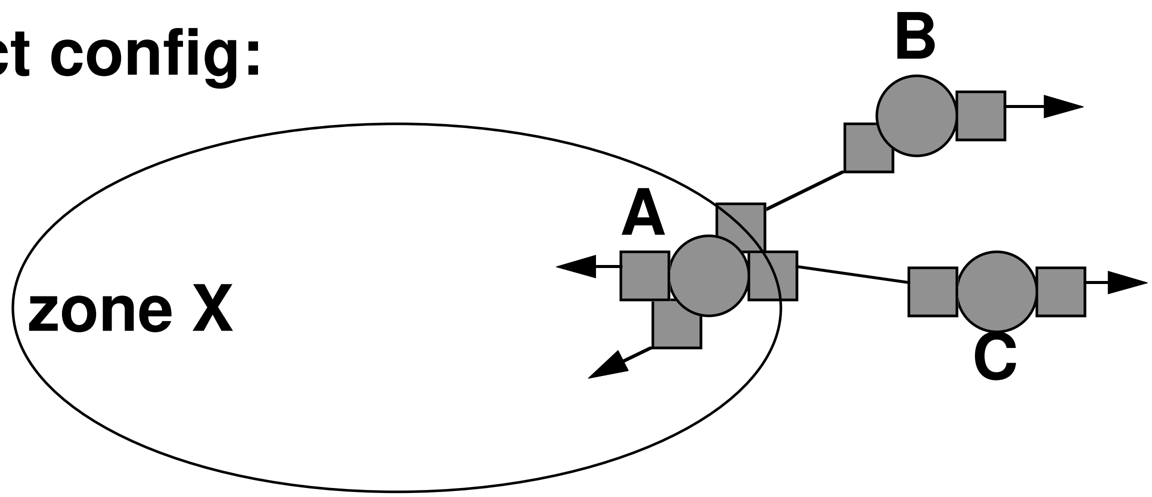
Local Scope

draft-ietf-mboned-admin-ip-space:

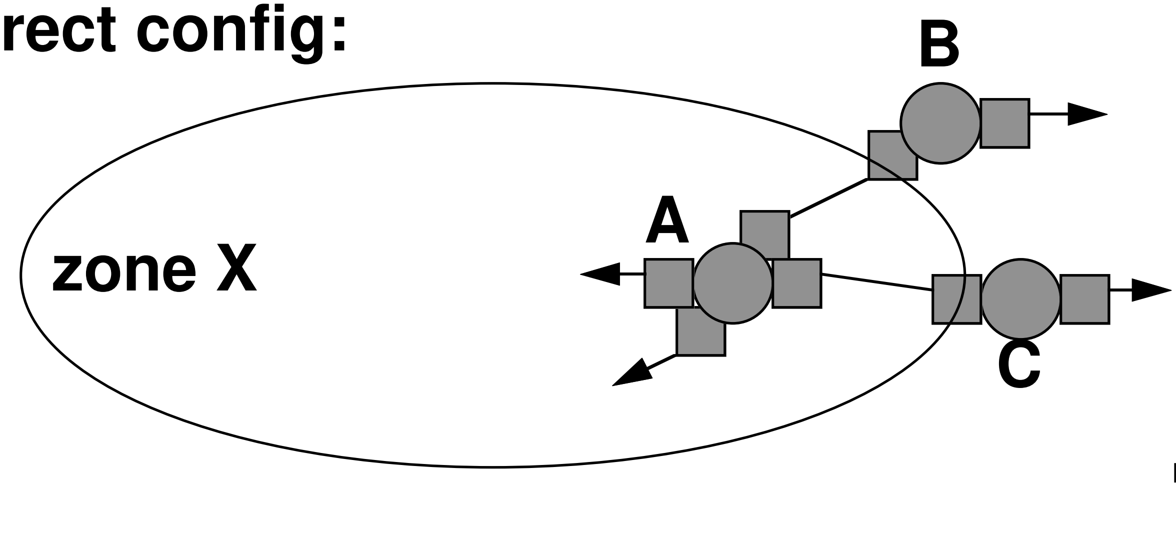
"The Local Scope is the minimal enclosing scope, and hence is not further divisible. .... In the event that scope regions overlap in area, the area of overlap must be in its own local scope. This implies that any scope boundary is also a boundary for the Local Scope."

Scope config

Correct config:



Incorrect config:



Zone Discovery

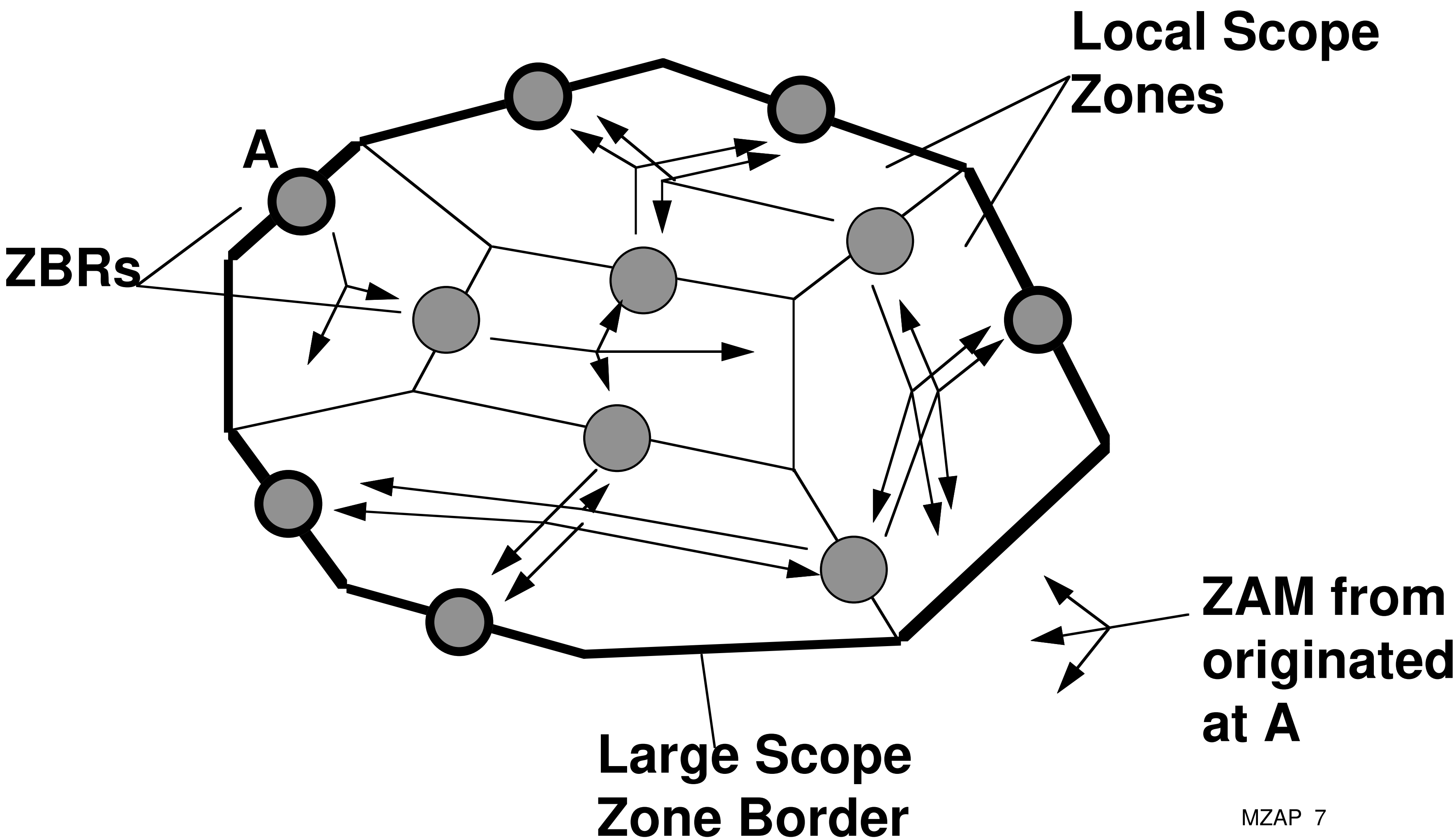
For a arbirtrary scope zones, Zone Border Routers multicast announcements of the border into the scope zone using a well-known Local Scope address.

***Internal* Local-Scope ZBRs receive these annoucements and *flood* them across the Local-Scope boundary, adding the zone-ID the message came from to the path in the message.**

- path prevents looping

Receivers within the scope zone can receive these messages by listening to the well-known Local-Scope address to discover the zones they are within.

Zone Discovery



Zone ID

Each local scope zone needs a zone ID to be added to the path of Zone Announcement Messages

Simple solution:

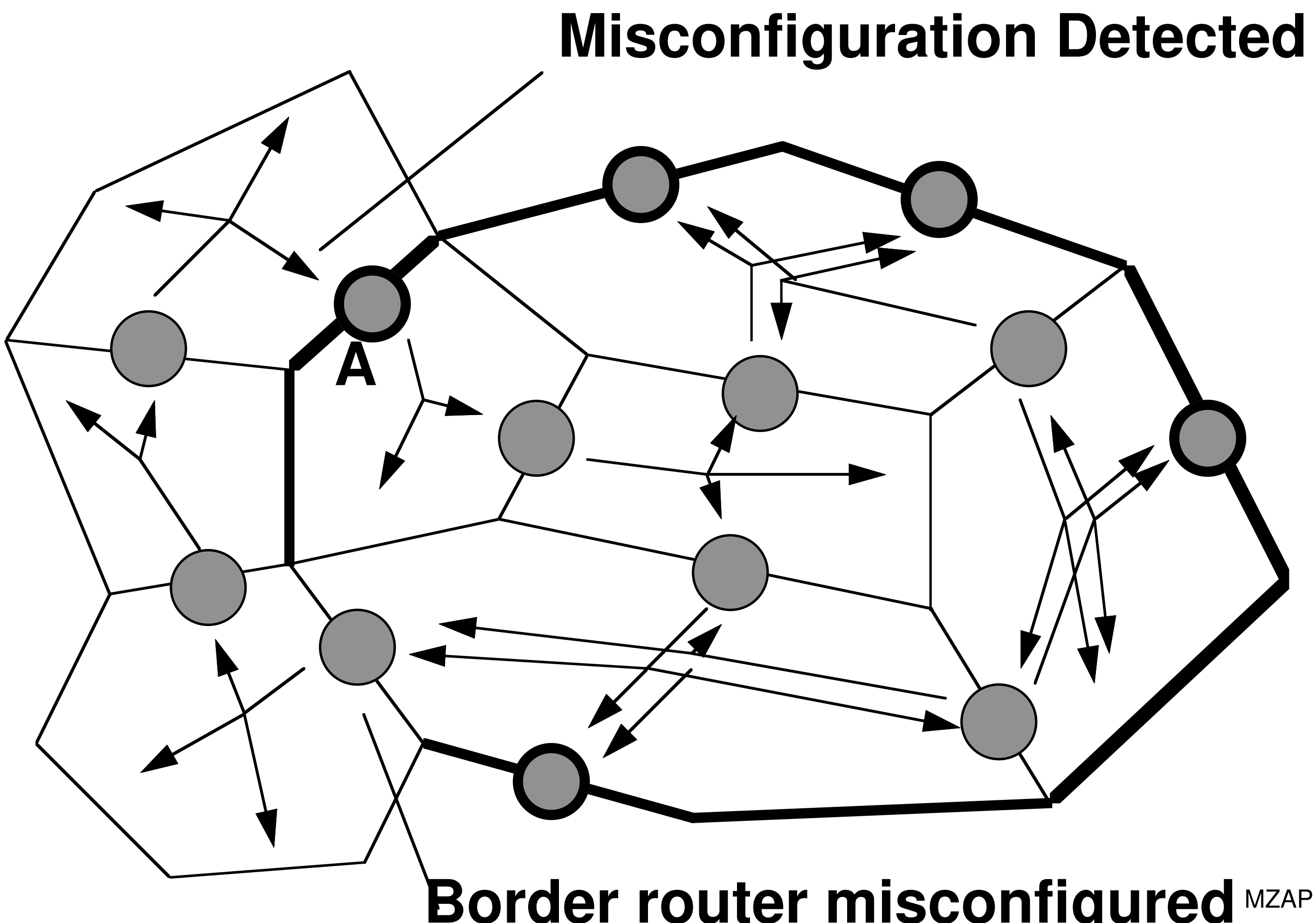
- Local-Scope ZBRs also exchange zone announcement messages which *don't* cross Local-Scope boundaries
- Simply take the lowest IP address of the Local-Scope ZBRs internal interfaces as the zone ID.
- This may change occasionally, but doesn't really matter - just when this happens a ZAM may loop once or so because of inconsistencies. This can be reduced by keeping a list of the other Local Scope ZBRs.
- This assumes all border interfaces have addresses. Note: a router cannot substitute another interface address for this purpose!

Zone Leakage Detection

Two mechanisms:

- Set a maximum on the number of local zones a ZAM can traverse. When a ZAM reaches this distance, the packet is dropped and a Zone Limit Exceeded message is unicast to the ZAM originator.
  - » **possible implosion problems with this!**
  - » **ZAM must contain a flag to disable ZLE generation.**
- Flooding results in a ZAM reaching the a ZBR from the wrong interface.

Zone Leakage Detection



Non-convex Scope Zone Detection

We can’t discover non-convexity from Zone Announcement Messages because the flood in around many concavities.

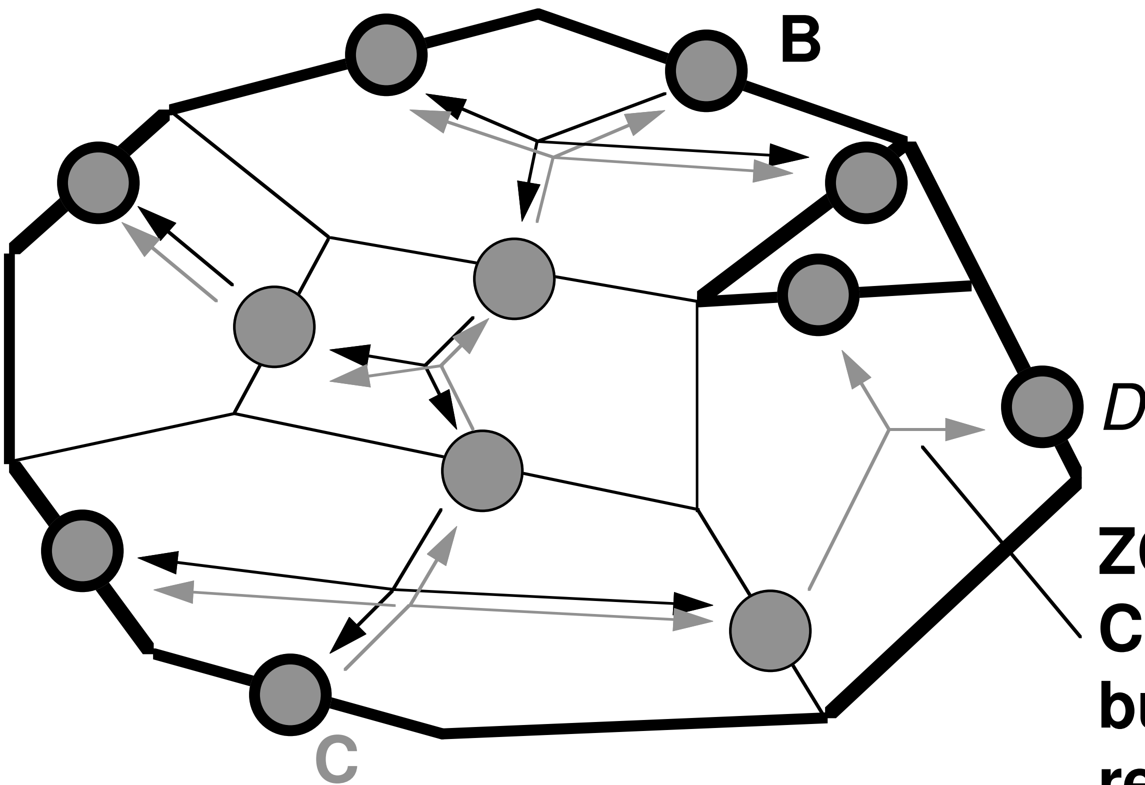
We can discover convexitys if we also make “announcements” by multicasting to an address within the scope zone range.

- These are called Zone Convexity Messages (ZCMs)

Each ZBR periodically announces all the other ZBRs it has seen making ZCMs in the last N minutes (where N is large, say 60mins).

If a ZBR doesn’t hear a ZCM from a ZBR that others are listing, it knows there’s a problem.

Zone Convexity Discovery



ZCM from C lists B, but D doesn't receive ZCMs from B

ZCM messages are routed, not flooded across local scope boundarys

Summary of MZAP

Three message types:

- **Zone Announcement Message (ZAM)**
  - multicast to local scope address
  - flooded accross local scope boundary
  - hosts listen to discover the scope zones that apply to them.
- **Zone Limit Exceeded (ZLE)**
  - unicast to originator of escaped ZAM
- **Zone Convexity Message (ZCM)**
  - multicast to zone-scoped address
  - lists other ZBRs so convexity problems can be discovered.