Lecture 5: 02/04
BGP/MIRO

Overview:

BGP — how it works
   - Laundry list of flaws
   - Some fixes.
   - Economics and MIRO.

How it works: Design goal: - provide reachability
         Unfortunately- loose tether holding the Internet today.
① Path vector   ② append check for loops   ③ apply import
and export policies.   ④ Selection process.

                    for end points
Consequences: ① Single opaque path per network per ISP
② No control over properties of path.
③

Flaws: Basic: ① Security: easy to hijack: secure BGP
            ② ② Convergence: pathological update sequences:
     Labovitz   can cause the protocol to take very long
     SigcommOO   to reach a point where everybody is in
                       agreement.
                                                  — dispute wheels
                    Oscillations
       ②—③ Policy: dispute wheels: hot-potato + policy.
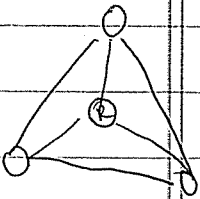   ④ Reliability, performance and control over
               path properties

fixes: Security — ① Secure BGP} — sign all announcements.

                       ② Secure - origin BGP
require protocol
level changes; also   ② listen-and-whisper
changes need to be
universal: ain't happening

Convergence : Hierarchical routing (L·S + D·V)

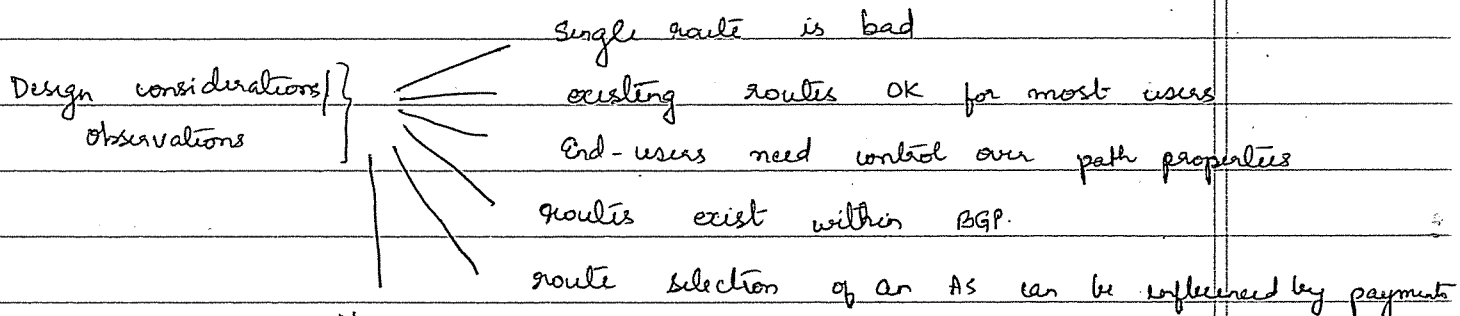Performance and Reliability:

Multihoming   and   overlay routing   and   source routing
Single end control   Support from a n/w   control over entire
                                                              path.

Control over path properties — no good solution today
that is both scalable and appealing.

Reason : no incentives for ISPs to honor the solution
or not enough control for end-points

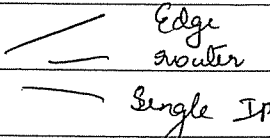MIRO: backward compatible way of getting us there.

Design considerations/ }   Single route is bad
Observations   existing routes OK for most users
                                 End-users need control over path properties
                                 routes exist within BGP.
                                 route selection of an AS can be influenced by payments
         Hard for an AS to influence another ASes route selection.
Goal MIRO is trying to achieve: (?)
Design principles:
① Pull-based route retrieval for backward compatibility
   (push-based too expensive; may be unnecessary)
② Bi-lateral negotiation among ISPs to get additional
   routes
③ Selective export of extra routes } based on policies.
④ Tunnels to forward packets

Implementation — iBGP also implements single path selection

So — need coordination

Tunnel implementation ⟍ Edge router

⟍ Single IP

Issues with MIRO:

① When should an AS request an alternate path?

② How does it know what to request and ~~whether~~? and who to?

③ ~~the~~ What exactly is the "protocol" especially between remote ISPs?

    ⤷ wouldn't it need a contract and if it did, why not give more routes and not have to deal w/ understanding the semantics of the routes?

④ Still has convergence problems

⑤ what if neighbor pushes back due to unexpected traffic from sources not seen before?