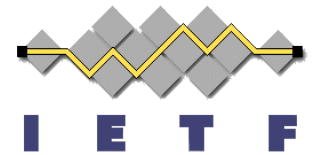
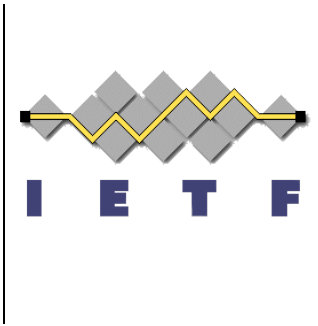


Non-Deterministic IPv6 Tunnels considered Harmful

G. Van de Velde,
O. Troan,
T. Chown

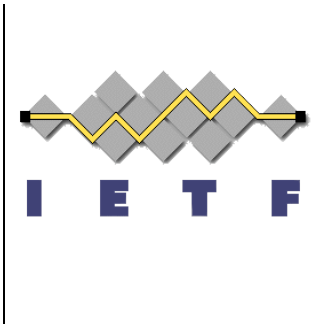


IETF 75, June 28th 2009
Stockholm



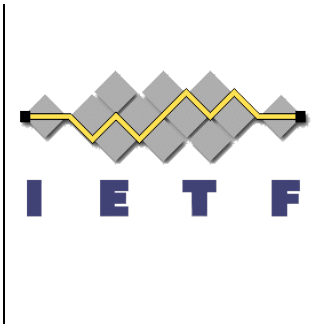
Draft objective

- Provide IPv6 connectivity as good as the perceived IPv4 connectivity
- Non-deterministic tunnels may have properties which may degrade connectivity quality and integrity
- Document considerations for non-deterministic tunnels



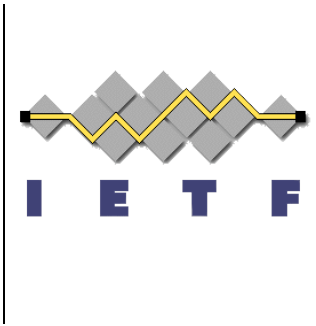
The Properties

- General:
 - Comparison between native and non-deterministic tunnel
 - Anycast or other well known addresses may direct towards badly functioning relay-router
 - There may be asymmetric routing behavior
- Performance
 - Decoupling of performance expectation between relay-routers and the users
 - Initial deployments have been working really well, but if used for mainstream operation, then performance expectation may not be stable (no motivation for the relay-router providers to upgrade capacity)



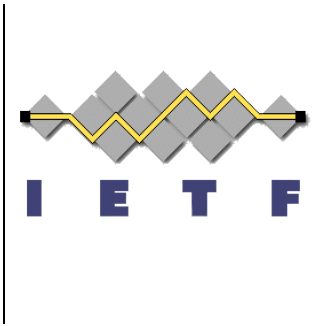
The Properties

- Topological Considerations
 - Sub-optimal flows (increase in RTT and packet loss)
 - Increase of non-deterministic tunnel usage for low performance relay-routers
- Operational Provisioning
 - Good tunnel behavior is often outside the control of the person using the tunnel (3rd party involvement, unforeseen traffic paths)
 - Deterministic tunneling has better control about this



The Properties

- Troubleshooting
 - What to do with a 3rd party aggregation device?
- Security
 - draft-ietf-v6ops-tunnel-security-concerns-01
 - rfc3964
 - Do you trust the 3rd party ag/de-gregator
 - Firewall, IDS and tunneling?
- Content Services
 - Content providers experience additional delay $O(100\text{msec})$ when non-deterministic tunnels are used
 - Response times are of business critical importance for these companies... due to marginal IPv6 connectivity they keep IPv6 support restricted



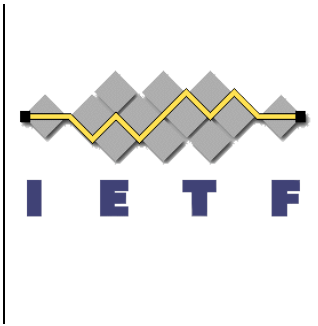
Conclusion?

- Early adopters have been working fine with non-deterministic tunnels
- For mainstream usage it may give blackholing, perverse traffic paths, lack of business incentive, difficult security model and tough operational management.



Next steps

- What should be done with this paper?
- How does the community see non-deterministic tunnels in the future?



draft-vandeveldede-v6ops-harmful-tunnels.txt

THANK YOU!