



Mobile Multi-Layered IPsec

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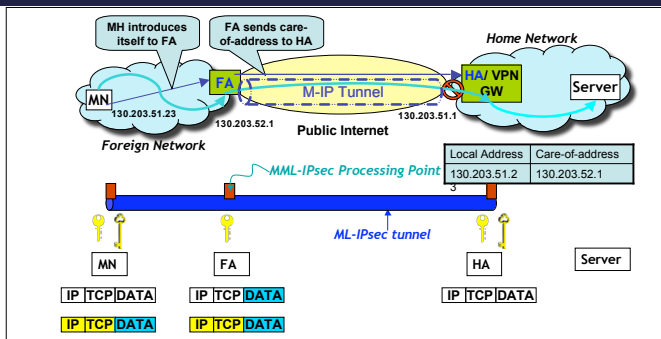
Why do Performance and Security matter?

- ❑ High packet loss and High delay variation
- ❑ Reliable Multicast
- ❑ Security in foreign Network

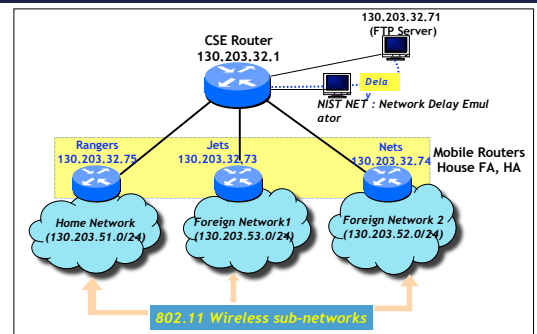
Mobile Multi-Layered IPsec

- ❑ Security
 - Mobility Support Key Distribution Protocols
 - Re-keying of distributed keys
 - GDOI Multicast Key Distribution
- ❑ Performance
 - MML-IPsec integrate SNOOP in edge routers (FAs)
 - Reliable Multicast: Ack Compression at edge routers

ML-IPsec and Mobile IP Integration

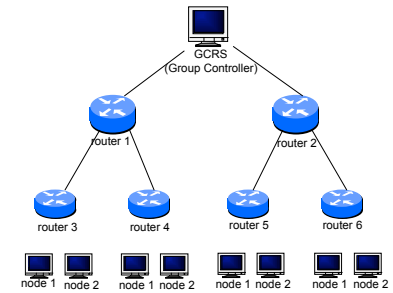
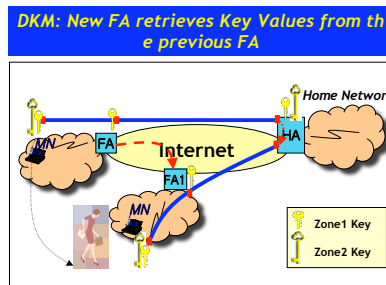
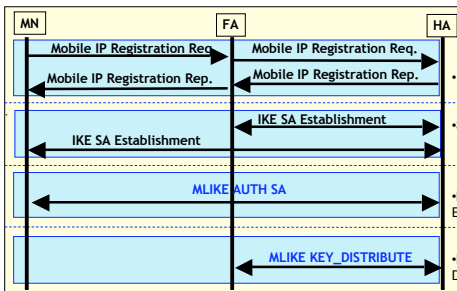


Test Bed



MML-IPsec Initialization & Key Distribution Protocols

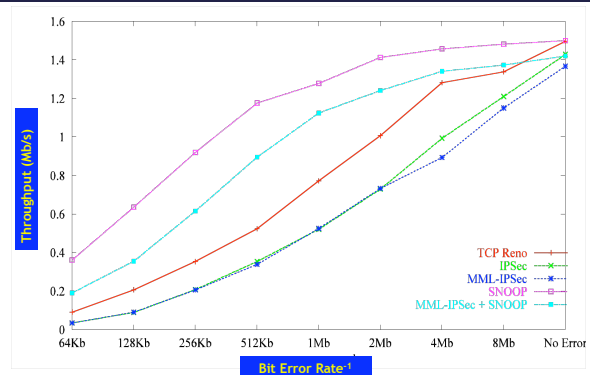
GDOI Example Scenario



Performance

Message Processing Time	Protocols		
	Initiator	Responder	Total
IKE SA Establish	13.3 ms	13.42 ms	26.72 ms
MLIKE CSA Establish	53.2 ms	29.1 ms	82.3 ms
MLIKE CREATE(rekey)	1.3 ms	1.35 ms	2.65 ms
MLIKE Key Distribution	0.4 ms	0.2 ms	0.6 ms
PKD Key Distribution	0.3 ms	0.2 ms	0.5 ms
DKM Key Distribution	0.3 ms	0.2 ms	0.5 ms
Neighbor Notification	2.0 ms	7.3 ms	9.3 ms

Handoff Delay	Phase			
	Pure Mobile IP	Mobile IP with IPsec	MML-IPsec PKD	MML-IPsec DKM
Initialization	26 ms	197 ms	539(219) ms	542(222) ms
Handoff	25 ms	54 ms	56 ms	100 ms



Key Distribution Protocol Overhead

Throughput