Cryptographically Generated IPv6 Addresses (CGA)

- **Basic idea:**

  Interface Id = hash (Public Key)

  The public key is used to authenticate messages sent from the CGA address.

  ➔ Proof of address ownership without security infrastructure.

- **Prior work:**

  draft-roe-mobileip-updateauth, draft-montenegro-sucv, draft-nikander-ipng-pbk-addresses, draft-moskowitz-hip

- **Covered by IPR**

Problems

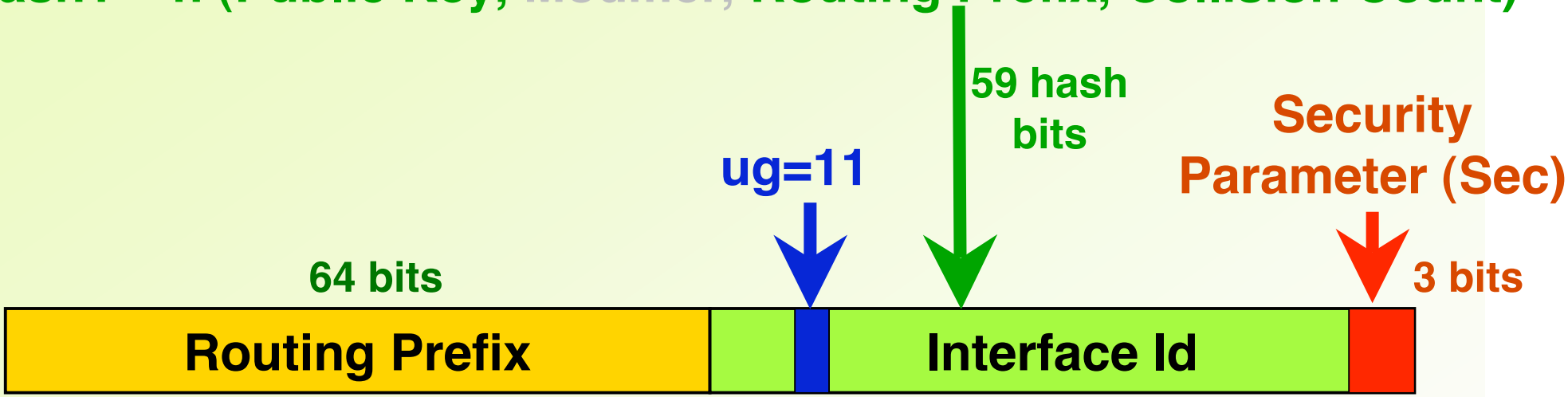
- 64 bit limit for hash length
  - ➔ eventual failure because of Moore's law
  - ➔ pre-computation attacks (2^64 memory)
- Detailed formats and algorithms missing
- Drafts incompatible with each other and with standard authentication protocols

draft-aura-cga-00

- Fully specified address formats and address-generation and verification algorithms
- The 64-bit limit effectively removed:
  - security parameter (Sec)
  - ➔ cost of generating an address multiplied by 2^{12*Sec}
  - ➔ cost of attacks increased from ~2^{62} to $2^{59+12*Sec}$
  - ➔ cost of authentication remains constant
- CGA address indicated by g=1, u=1 (not essential but allows mixing of authenticated and unauthenticated nodes)

CGA Address Format

Hash1 = h (Public Key, Modifier, Routing Prefix, Collision Count)



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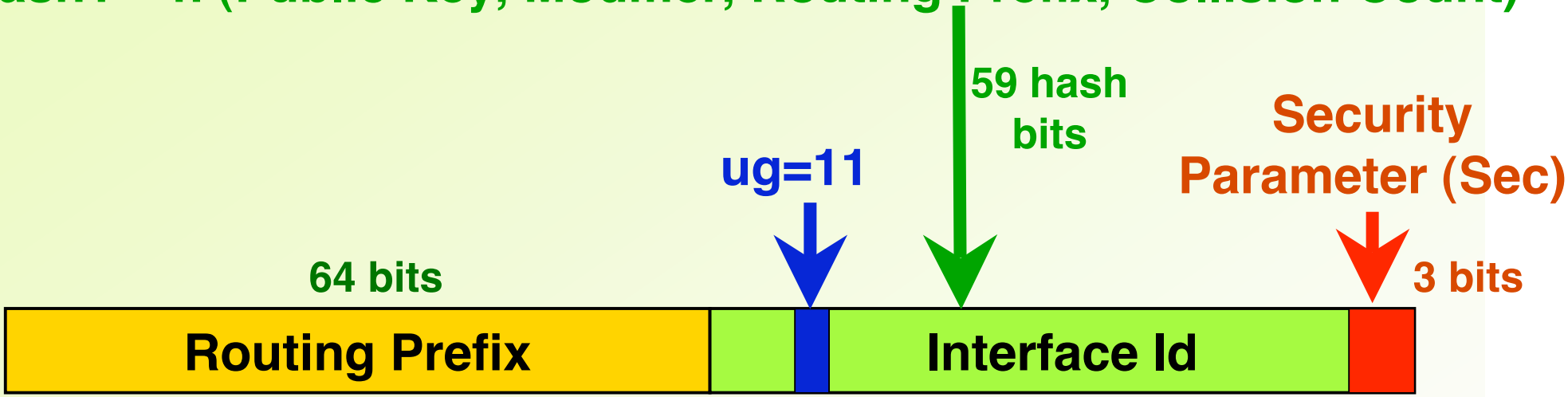

Hash2 = h (Public Key, Modifier)

New requirement: Modifier must be chosen so that Hash2 begins with 12*Sec zero bits.

Two CGA Parameter Formats

1. **Certificate format:**
   - **Public key and parameters stored in a self-signed X.509 certificate _ Easy to use in certificate-based authentication protocols**
   - **New certificate extension contains the parameters: Modifier, Routing Prefix, Collision Count**
2. **Optimized (short) format:**
   - **Concatenation of the public key and parameters**
   - **Public key + 29 bytes**

- **Verifier needs: signed message (e.g. NA), source IP address, and parameters in either format**