draft-irtf-cfrg-voprf

Latest updates in -04

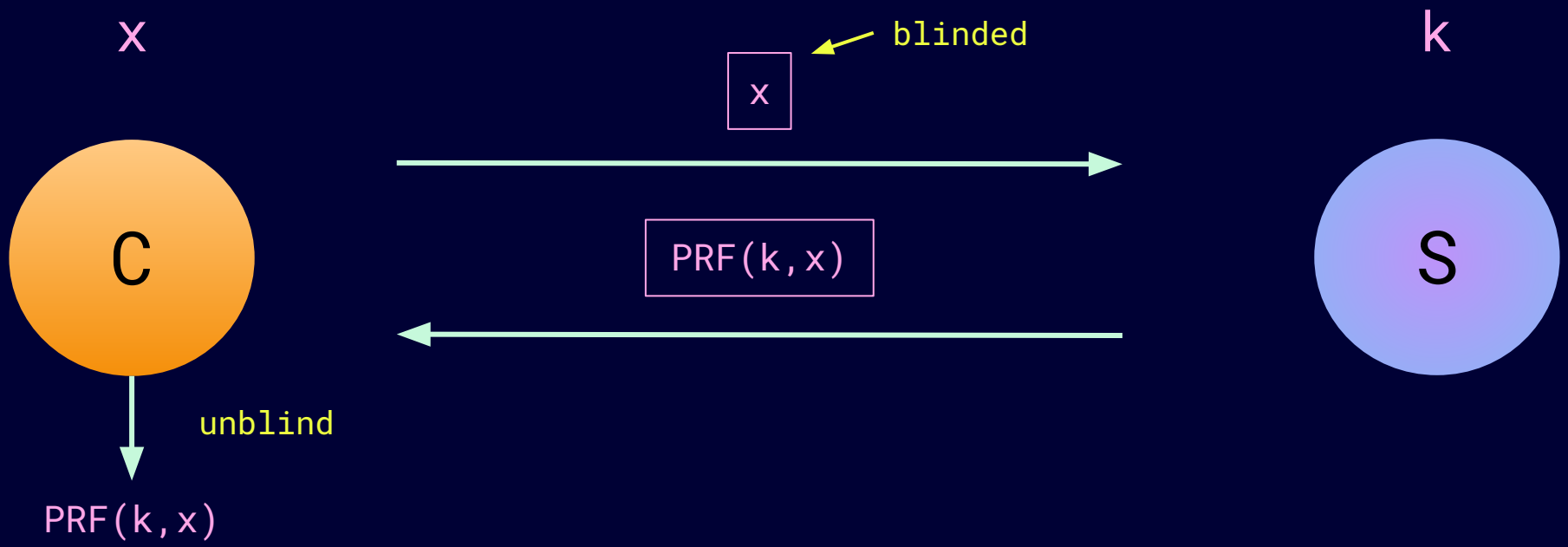
CFRG Interim Meeting, 15 July 2020

Alex Davidson, Cloudflare

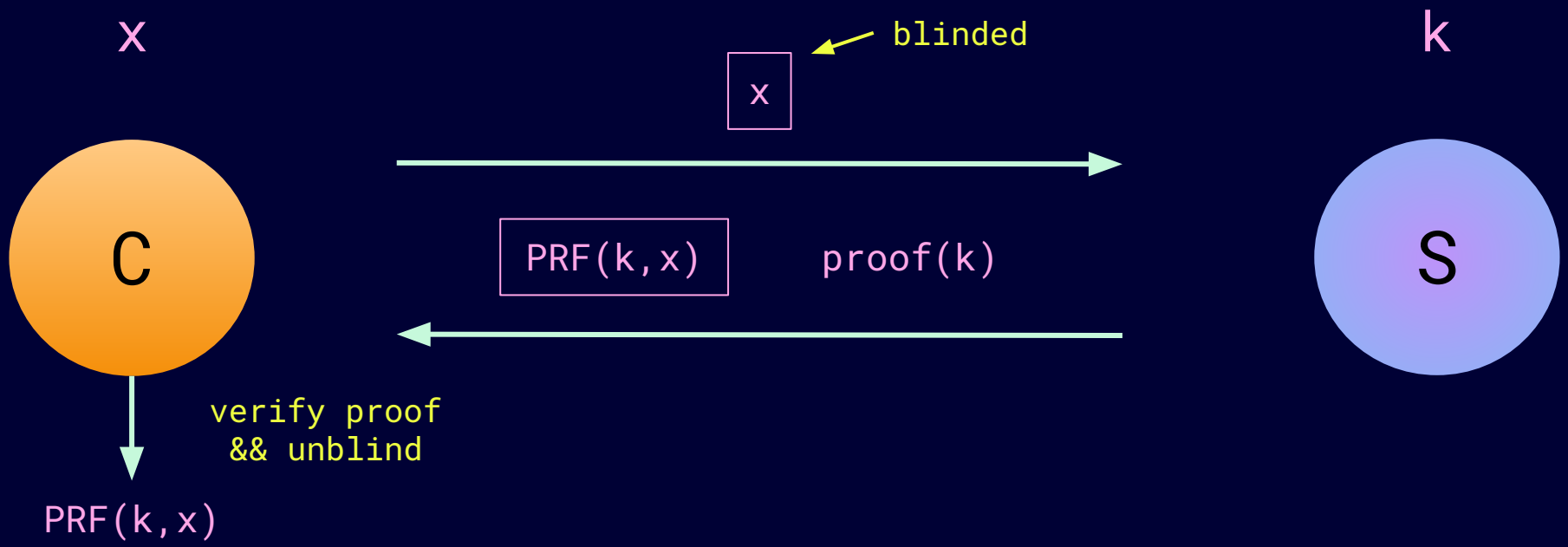
background

CFRG interim meeting

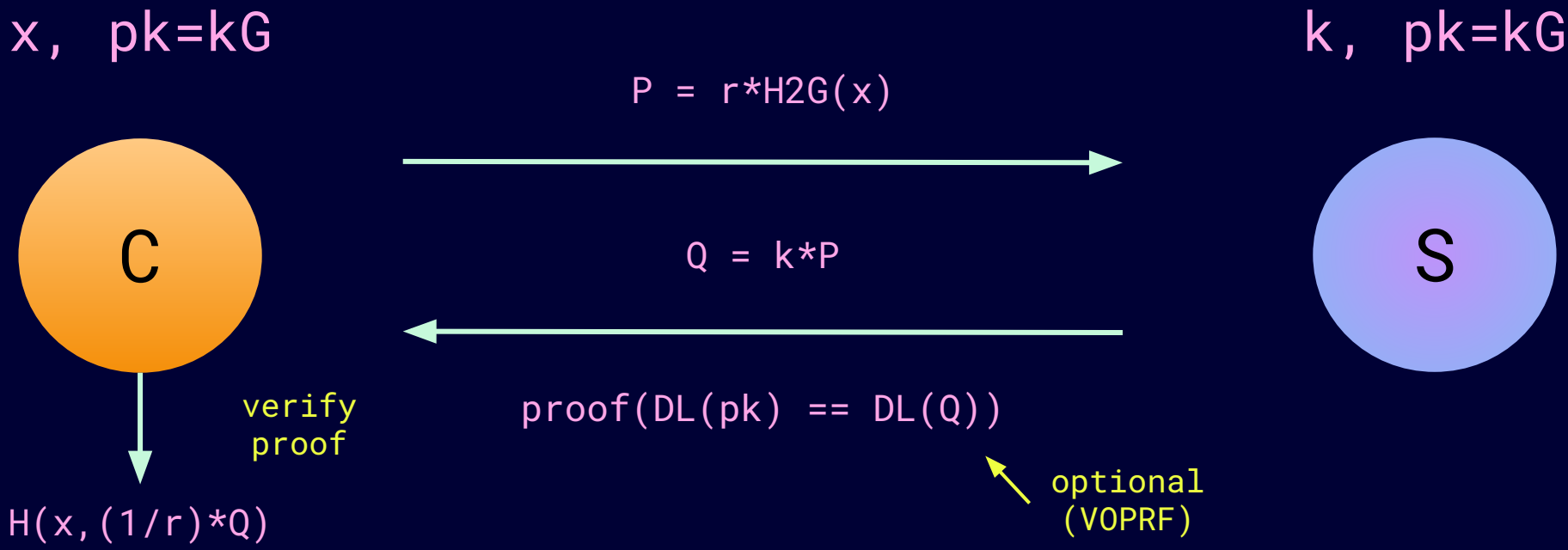
Oblivious Pseudorandom Functions (OPRF)



Verifiable OPRF (VOPRF)



Prime-order groups



Related applications

Privacy Pass: datatracker.ietf.org/wg/privacypass/

OPAQUE: draft-krawczyk-cfrg-opaque

Trust Token API: github.com/WICG/trust-token-api

draft-04 updates

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Major API changes

Client & Server global contexts [Section 4.4]

- modeVerifiable
- function instantiations:
  - Server: KeyGen, Evaluate, VerifyFinalize
  - Client: Blind, Unblind, Finalize

Remove batching as standard

- Present as an efficiency improvement

Ciphersuites

Including support for 128-bit security ciphersuites [Section 5]:

- P-256
- curve25519

Consolidate all hash functions into SHA-512

Ciphersuites

All supported ciphersuites:

- OPRF(curve25519, SHA-512) [Section 5.1]
- OPRF(curve448, SHA-512) [Section 5.2]
- OPRF(P-256, SHA-512) [Section 5.3]
- OPRF(P-384, SHA-512) [Section 5.4]
- OPRF(P-521, SHA-512) [Section 5.5]

Hoping to include ristretto/decaf support in the future

Prime-order group API

Concrete API for instantiating prime-order group [Section 3.1]

Group elements no longer exposed in public API

Instructions for implementing prime-order groups for all ECC ciphersuites [Section 5]

Other updates

Proof-of-concept sage implementation

Improved DST usage to remove HMAC/HKDF for ROM

Updates for latest hash-to-curve draft

concluding remarks

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TODOs

Update PoC implementations in go, rust, BoringSSL (github.com/alxdavids/voprf-poc)

ristretto/decaf ciphersuites?

Test vectors in draft

Questions?

We think API should remain stable now

Thoughts on state of document?

Plan for RGLC?

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