36th RIPE Meeting
Budapest 2000

APNIC Certificate Authority
Status Report

APNIC CA Project

- Cryptography and PKI Overview
- APNIC CA project
- Benefits and costs
- Project plans
- Future developments
- References

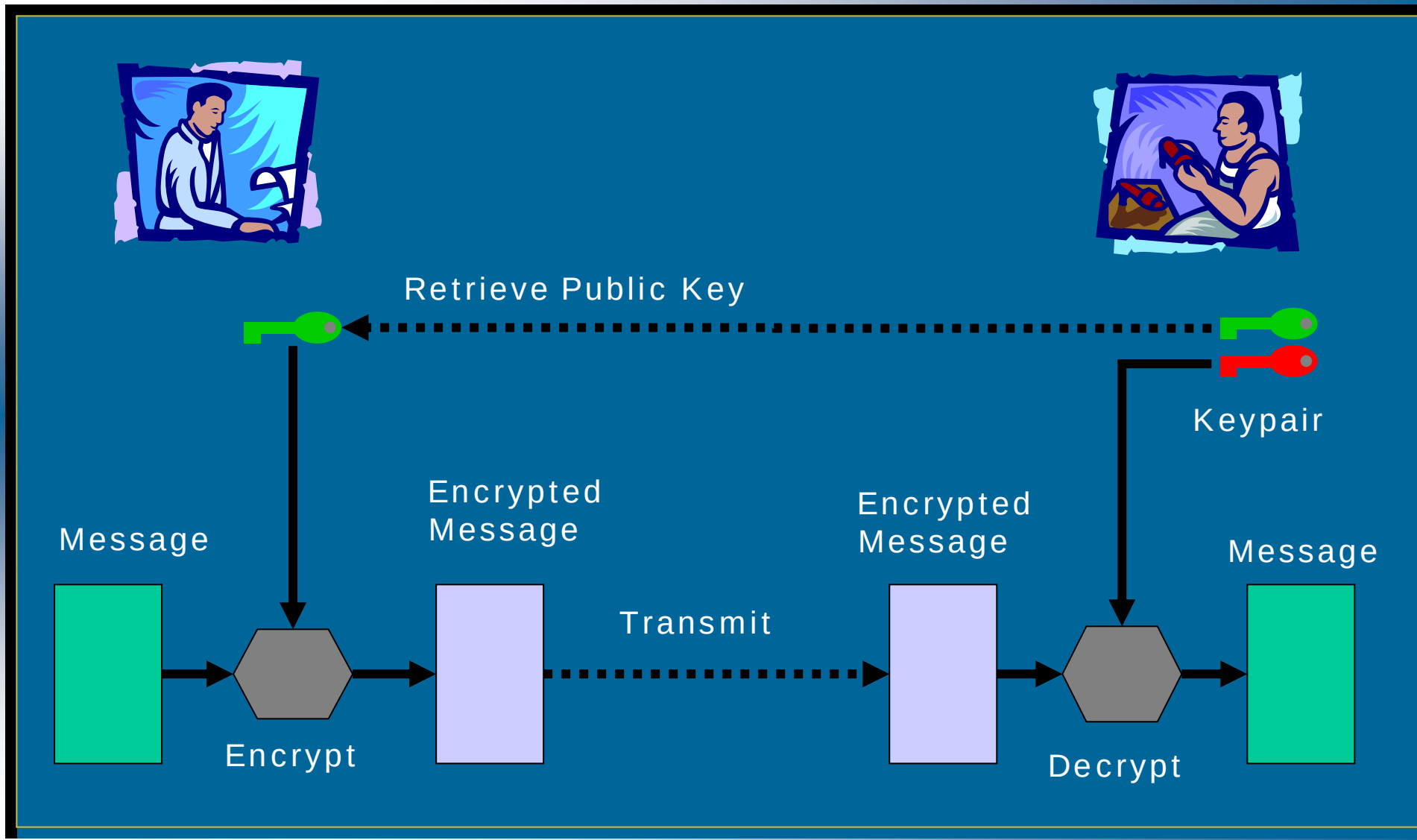
- Questions?

Cryptography - Terms

- Public key cryptography
  - Cryptography technique using different keys for encoding and decoding messages
- Keypair
  - Private key and public key, generated together, used in public key cryptography
- Encryption/Decryption
  - To encode/decode a message using a public or private key

Public Key Cryptography

- Encryption



Public Key Cryptography

- Encryption

Retrieve Public Key

Keypair

Message

"Signed" Message

"Signed" Message

Message

Transmit

Encrypt

Decrypt

Public Key Cryptography

- Digital Signature

Keypair

Message

Signed Message

Assemble

Hash

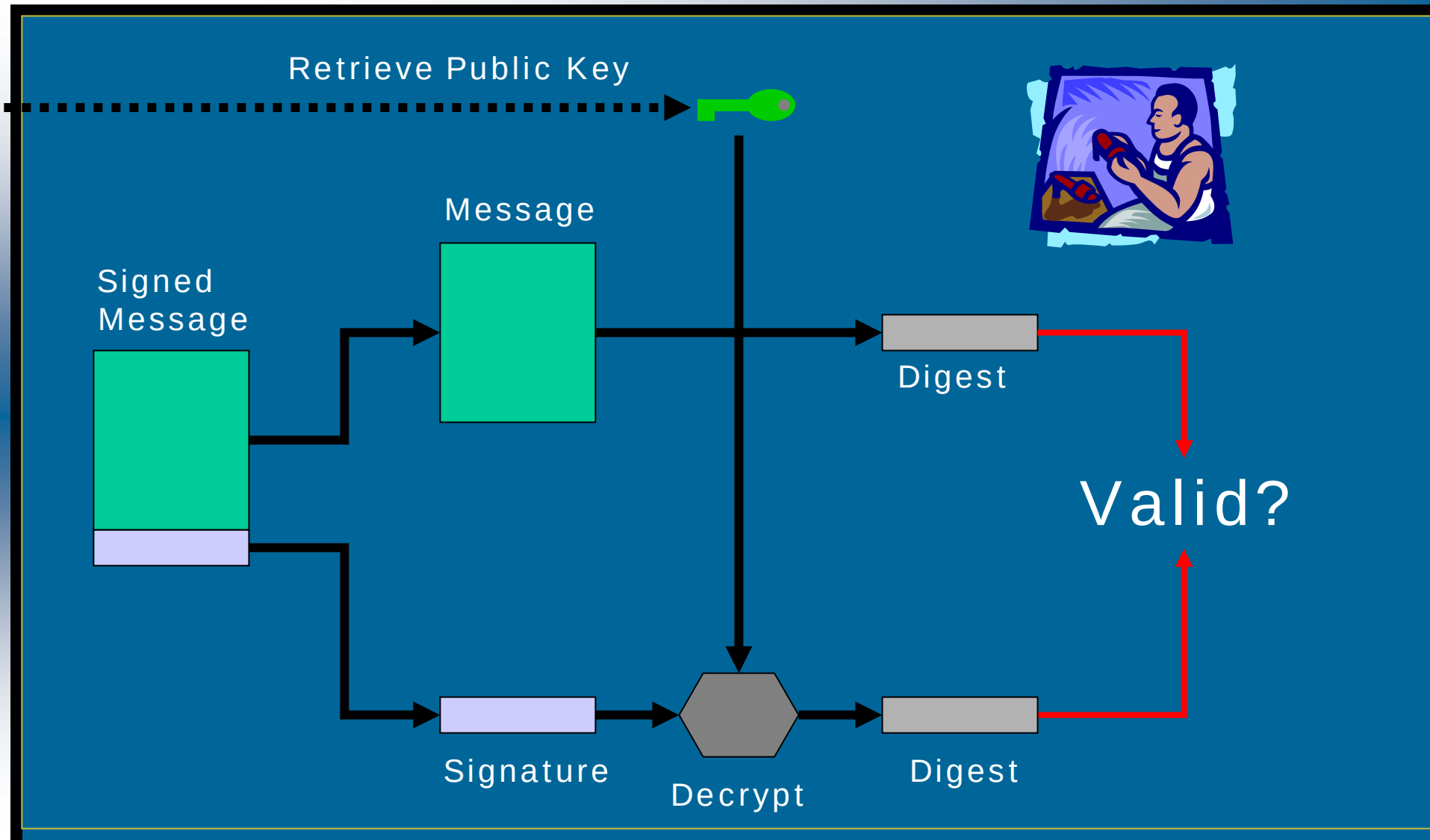
Digest

Encrypt

Signature

Public Key Cryptography

- Digital Signature



PKI - Terminology

- Public Key Infrastructure (PKI)
  - Administrative structure for support of public key cryptography
- Public Key Certificate (Digital Certificate)
  - Document linking a Public Key to an identity, signed by a CA, defined by X.509
- Certificate Authority (CA)
  - Trusted authority which issues digital certificates

Digital Certificates

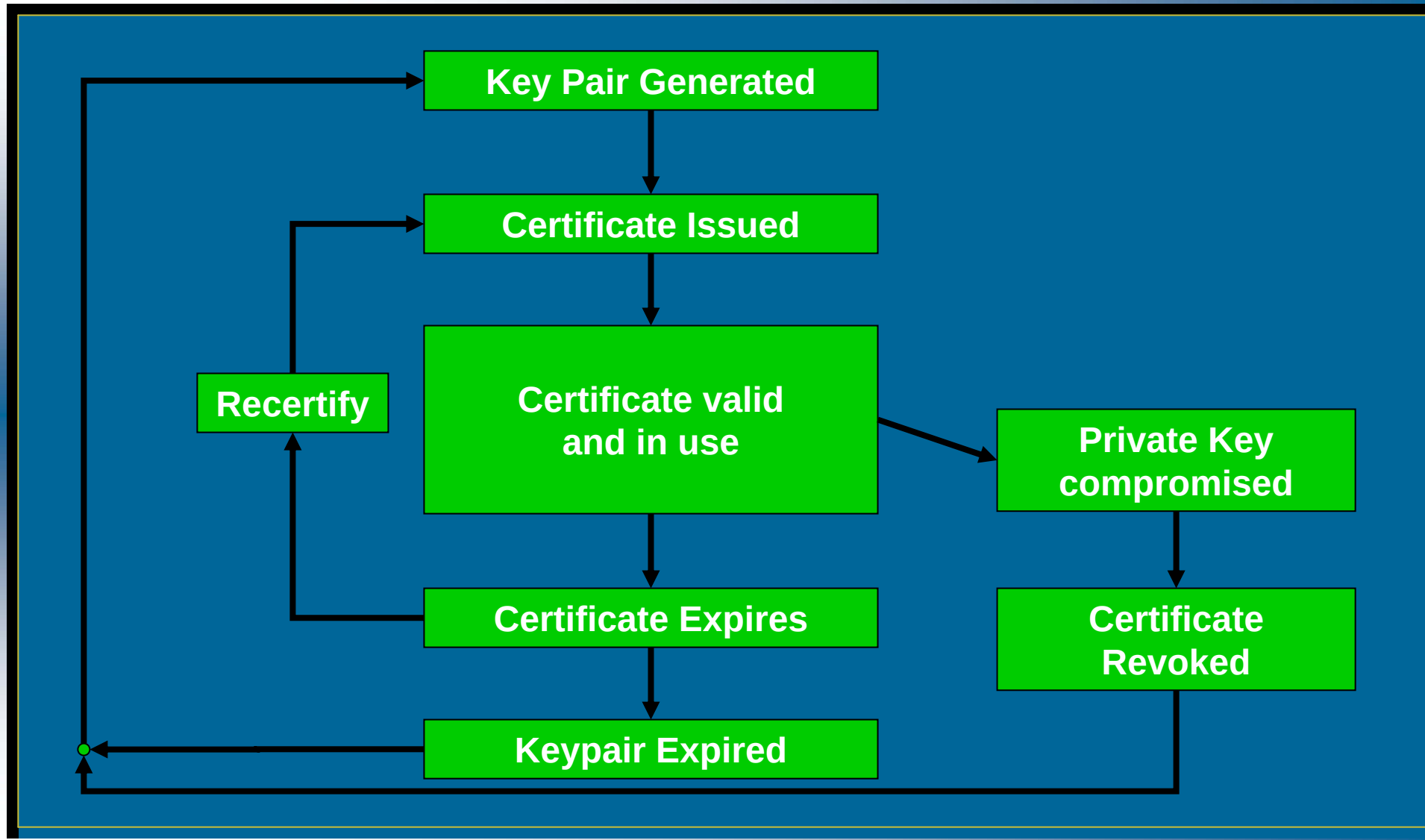
- A digital certificate contains:
  - Identity details
    - eg Personal ID, email address, web site URL
  - Public key of identity
  - Issuer (Certification Authority)
  - Validity period
  - Attributes
- The certificate is *signed* by the CA

Digital Certificate - Example

```
Certificate ::= SEQUENCE {
        tbsCertificate          TBSCertificate,
        signatureAlgorithm              AlgorithmIdentifier,
        signature               BIT STRING
    }

TBSCertificate ::= SEQUENCE {
        version                 [0]     EXPLICIT Version DEFAULT v1,
        serialNumber                    CertificateSerialNumber,
        signature               AlgorithmIdentifier,
        issuer                  Name,
        validity                Validity,
        subject                 Name,
        subjectPublicKeyInfo            SubjectPublicKeyInfo,
        issuerUniqueID  [1]     IMPLICIT UniqueIdentifier OPTIONAL,
        subjectUniqueID [2]     IMPLICIT UniqueIdentifier OPTIONAL,
        extensions      [3]     EXPLICIT Extensions OPTIONAL
    }
```

Digital Certificate - Lifecycle



APNIC CA - Why?

- In response to
  - Membership concern for greater security
    - Confidential info exchange with APNIC
    - Is my database transaction secure?
    - Whose prefixes do you accept?
  - Internet community interest in security, PKI, digital certificates
    - e.g. rps-auth
    - IETF working group: PKIX

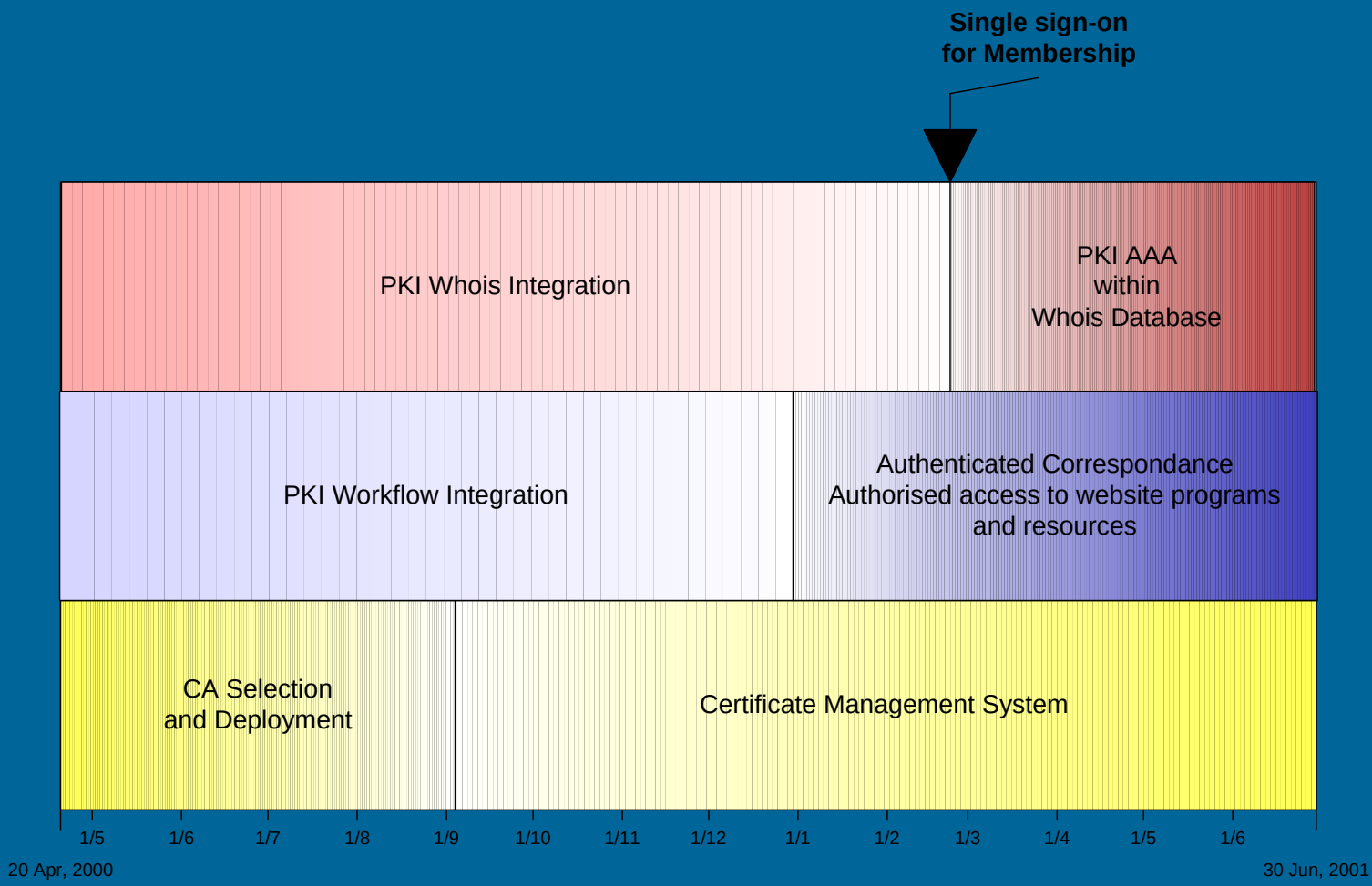
APNIC CA - Overview

- Certificate issued to APNIC member
  - Corresponds to *Membership* of APNIC
  - Provides uniform mechanism for all security needs, such as:
    - Encryption and signature of email with APNIC
    - Authentication of access to APNIC web site
    - Secure maintainer mechanism for APNIC database
    - Future authorisation mechanism for Internet resources
    - Authentication of resource custodianship

APNIC CA - Benefits/Costs

- Benefits
  - Uniform industry-standard mechanism for “single password” security, authentication and authorisation
  - Strong public key cryptography, end-to-end
- Costs
  - Server and client software
  - Change to current procedures
  - New policies
  - Establishment: software purchase and/or development

APNIC CA - Roadmap



APNIC CA - Timeline

Scoping project	Oct 1999 - Jan 2000
Phase 1	Apr – Nov 2000
Phase 2	Jan – Jun 2001

APNIC CA – Phase 1 Timeline

Requirements Document	April – May
Programming and Testing	May – Sep
Initial deployment	Sep - Nov

APNIC CA - Scoping Project

- October 1999 - January 2000
- Objectives
  - Analyse impact of introducing PKI
  - Provide focus for discussions
  - Raise awareness of PKI in general
- Conclusions
  - Significant benefits for members' security
  - Growing standards support for PKI
  - See: http://www.apnic.net/ca

APNIC CA – Phase 1

- April – November 2000
- Deliverables
  - Tender and selection of CA software
  - Policies for use of APNIC Certificates
  - Procedures for issuance and revocation of Identity certificates to members
  - Browser and deployment issues analysis
  - Issue trial certificates at APNIC Meeting October 2000
  - Risk Analysis

APNIC CA – Phase 2

- January – June 2001
- Deliverables
  - Certificates used for website access control
  - Support for X509 certificates in whois database
  - Strong encryption for member correspondence
  - Investigation of use of Attribute Certificates with resource allocation

APNIC CA - Future

- Generalised CA function
  - APNIC Certificates may be used for general purposes
  - Requires tight policy and quality framework for APNIC certificates to be trusted
- Hierarchical certification
  - APNIC Members may use their certificates to certify their own members or customers
  - May be applicable for ISPs and NIRs

APNIC CA - Future

- Public Key Certificates
  - X.509 certificate linking a Public Key to an identity, issued by CA
- Attribute Certificates
  - X.509 certificate linking Attributes to an identity, issued by CA or other authority
  - Provides *authorisation*, rather than *authentication,* information
  - Not yet widely deployed or supported
  - May be extended to carry resource allocation information

APNIC CA - Future

- Resource certification
  - For verification of resource allocations by RIRs
  - Currently under discussion in IETF PKIX working group

    draft-clynn-bgp-x509-auth-01.txt

    "X.509 Extensions for Authorization of IP Addresses AS Numbers, and Routers within an AS"
  - APNIC watching developments

APNIC CA - Consultation

- Mailing list open after Apricot2000
  - pki-wg@lists.apnic.net
  - http://www.apnic.net/wilma-bin/wilma/pki-wg
- Further developments
  - See: http://www.apnic.net/ca

APNIC CA - Documents

- IETF PKIX drafts:

  draft-ietf-pkix-roadmap-04.txt

  "Internet X.509 Public Key Infrastructure PKIX Roadmap"

  draft-clynn-bgp-x509-auth-01.txt

  "X.509 Extensions for Authorization of IP Addresses AS Numbers, and Routers within an AS"

  draft-ietf-pkix-ac509prof-01.txt

  "An Internet Attribute Certificate Profile for Authorization"

- http://www.ietf.org/html.charters/pkix-charter.html

Questions?