

IBE: Is It Needed?



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Quick Notes

- It's easy to conflate IBE with Bilinear Map PKC
- I will try to stay to IBE in general
- Comments are not about implementations
 - Except when noted
 - Most comments apply to my IBE as well as others
- Everything has plusses and minuses
- Everything has appropriate uses



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Inherent Brittleness

- All IBE (and all BLM) crypto has
 - A basic “key”
 - Subordinate, derived keys
 - This is the PKG for IBE
- This means that rollover, revocation, expiration, etc. are hard
 - And they’re hard in unique ways
 - There are also interesting solutions
 - Identum, for example, has one PKG for all users
 - This is the Mark Twain solution
 - “Put all your eggs in one basket and then watch the basket”



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Naming is Hard!

- Nearly all rough edges of PKI reduce to naming problems
 - Ellison, Schneier, others point this out
- Some PKI systems are key-centric (SPKI)
 - Key-centrism exists because naming is hard
- Reducing a key system to naming removes the easy periphery
- We’re still left with the hard, thorny central issue
 - The thorny issue of naming is arguably *harder* with IBE
 - Since every name is a key, managing keys is managing names



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Networks Help Solve Naming Issues

- The core IBE advantage:
 - Key = $F(\text{Name})$
- Can be satisfied with a database / directory
- Is IBE needed when you can easily look up keys from the net?



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Online vs Offline IBE

- Offline IBE can compute $K=F(N)$ with no network
- Online IBE uses the net to compute $K=F(N)$ via the network
 - I presented this in 2006
 - Trades online-ness for ability to use traditional keys/certs
 - RSA, DSA, Elgamal, EC variants, etc.
 - Even works for Lattice, hash-chain, etc. PKC



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Is true IBE possible?

- Names alone are not enough
 - Even original Boneh-Franklin paper has a name of:
 - “bob@company.com □ current-year”
 - “bob@company.com □ current-date”
- Ironically, this is Certificate-Based Encryption
- Metadata is important!
 - Current trends create more metadata
- Names alone have no metadata
 - Lambda naming alone is good math, and bad information science



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How Do I Own a Name?

- It is trivial for me to prove I own the string “jon” to my server
- It is difficult for me to prove I own “jon” to your server

- It is easy for a server to assign a name
- It is hard to correctly assign a name

- Many entities have many names
- These turn in to many keys



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Key Management is Still Hard

- IBE creates many keys per name
 - bob@company.com via bank.com
 - bob.lastname@company.com via bank.com
 - bob@home.com via merchant.com
 - bob.lastname@company.com via ...
- Result is a sparse matrix of:
 - All your names * All the PKGs
- Thus the key management problem
 - Is very easy for each PKG
 - Grows in n^2 complexity for all users
- End-users are notoriously bad at complexity



Thank You

