

# IDENTIFIERS

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# Communication identifiers

Property	URL owned	URL provider	E.164 phone number	Service-specific
Example	<a href="mailto:alice@smith.name">alice@smith.name</a> sip:alice@smith.name	<a href="mailto:alice@gmail.com">alice@gmail.com</a> sip:alice@ilec.com	+1 202 555 1010	www.facebook.com/alice.example
Protocol-independent	no	no	yes	yes
Multimedia	yes	yes	maybe (VRS)	maybe
Portable	yes	no	somewhat	no
Groups	yes	yes	bridge number	not generally
Trademark issues	yes	unlikely	unlikely	possible
Privacy	Depends on name chosen (pseudonym)	Depends on naming scheme	mostly	Depends on provider "real name" policy

# Numbers vs. DNS & IP addresses

	Phone #	DNS	IP address
Role	<b>identifier</b> + locator	identifier	<b>locator</b> (+ identifier)
Country-specific	mostly	optional	no
# of devices / name	1 (except Google Voice)	any	1 (interface)
# names / device	1 for mobile	any	any
controlled by	carrier, but portability unclear (800#) and geo. limited	any entity, with trademark restrictions	any entity (ISP, organization)
who can obtain?	geographically-constrained, currently carrier only	varies (e.g., .edu & .mil, vs. .de)	enterprise, carrier
porting	complex, often manual; wireless-to-wireline may not work	about one hour (DNS cache)	if entity has been assigned PIAs
delegation	companies (number range)	anybody	subnets
identity information	carrier (OCN), billing name only → LERG, LIDB	WHOIS data (unverified)	RPKI, whois

All problems in computer science can be solved by another level of indirection, except of course for the problem of too many indirections. (David Wheeler)

# Humans vs. machines

	Human-visible	Machine-usable
Scope	local (“Mom”)	global
Persistence	temporary (“dentist”, “babysitter”)	often long-lived
Length	short (4-10?)	embeddable (< 200?)

many identifiers serve as both – but UI can hide details

# Communication modalities

< 1/year

Car  
Insurance  
company

“I have a  
refrigerator  
magnet”

unpredictable

Professional  
Colleagues &  
casual friends

“I know her  
email, but  
need to call  
her”

> 1/week

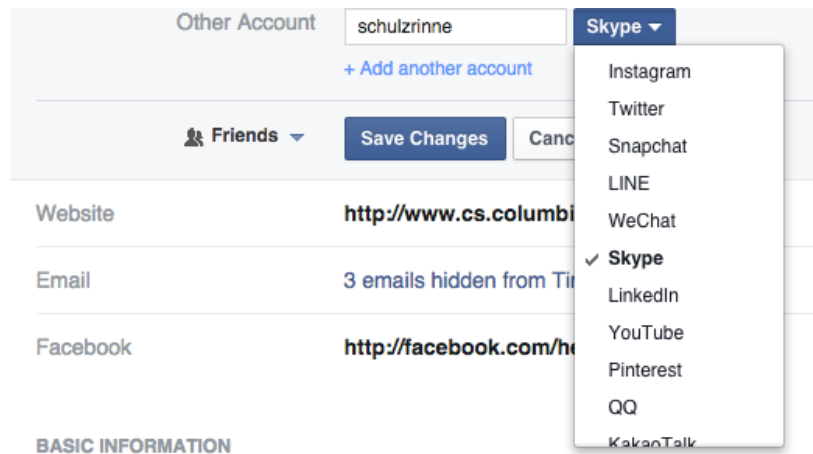
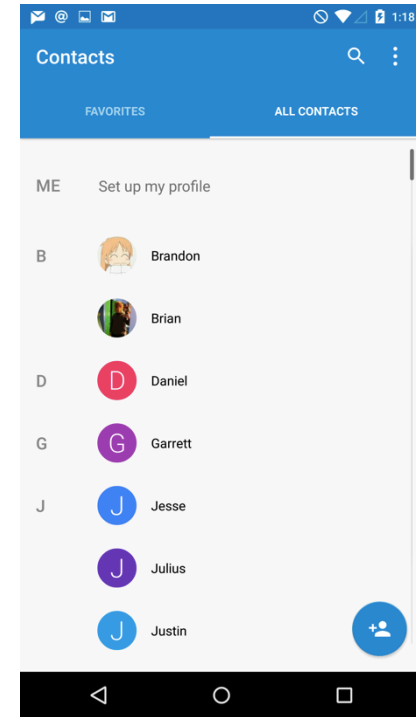
Close family &  
friends

“Alice and I  
always use  
Skype to  
chat.”

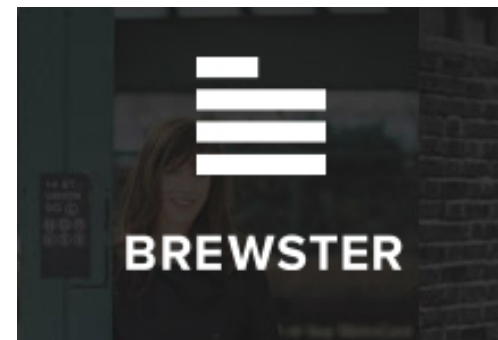
*not all communication identifiers are persistent*

# Identity options

- Universal communication app
  - Winner take all
- Directory intermediation?
  - But no universal query protocol
  - or update mechanism (tool publishes into address book)



LinkedIn



# Identifiers have social conventions

- Identifier = access permission
  - phone number, email address, ...
- Identifier = “pairing” permission
  - Skype: ask for permission
- Mutuality
  - only mutual Twitter followers can direct message each other



# Identifiers have social conventions

- A WhatsApp identifier is the phone number, but the expectation is that it will be used for messaging only, not calls.
- Pre-mobile days: friends only got your home number, colleagues only got your work number
  - and friends or colleagues wouldn't use the other
- Asking a person you met in a bar for their phone number has deep social connotations
- PO boxes and UPS “suites” provide semi-anonymity

# Special-purpose identifiers

- [hgs+rfctopic@cs.columbia.edu](mailto:hgs+rfctopic@cs.columbia.edu) identifiers spam scrape sources
- “burner” phone numbers
- one-time use email addresses
- forward-only email ([somebody@ieee.org](mailto:somebody@ieee.org), [braggard@alum.mit.edu](mailto:braggard@alum.mit.edu))

# Security $\cong$ identity assertion

- Need to be able to assert possession of identifiers
- Kind of works for...
  - *phone/SMS*: provide code
  - *email*: clickable link
  - *domain name*: modify DNS entry (for TLS certs)
- But third parties can't validate this automatically
  - → need certs for these identifiers (see: STIR for phone numbers)