GSS-API authentication support in SIP (work in progress)

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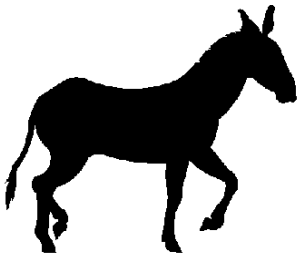
WANTED
Strong and flexible authentication method in SIP!

SIP authentication

1) **Digest Access Authentication (DAA) (RFC3261)**
   - mandatory
   - weak
   - widespread adoption
   - used to authenticate locally within a domain/realm



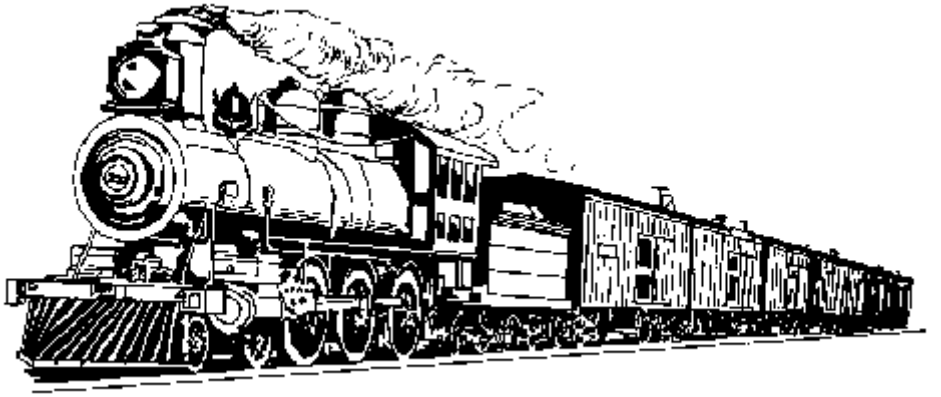
2) **S/MIME (RFC3261)**
   - Uses certificates, needs PKI = “complex and expensive”

3) **Other authentication methods**
   - P-Asserted identity (RFC3325) – in a trusted environment
   - Strong Identity (RFC4474) – using authentication service
   - Other academic approaches.

Problem

- SIP is flexible
- Problem: Different usage scenarios have different security requirements
  - Handheld devices vs. high-end SIP servers
- Goal: Modification to the SIP standard should be minimum
- Goal 2: A strong and flexible authentication methods wanted
- Solution: Add support for GSS-API

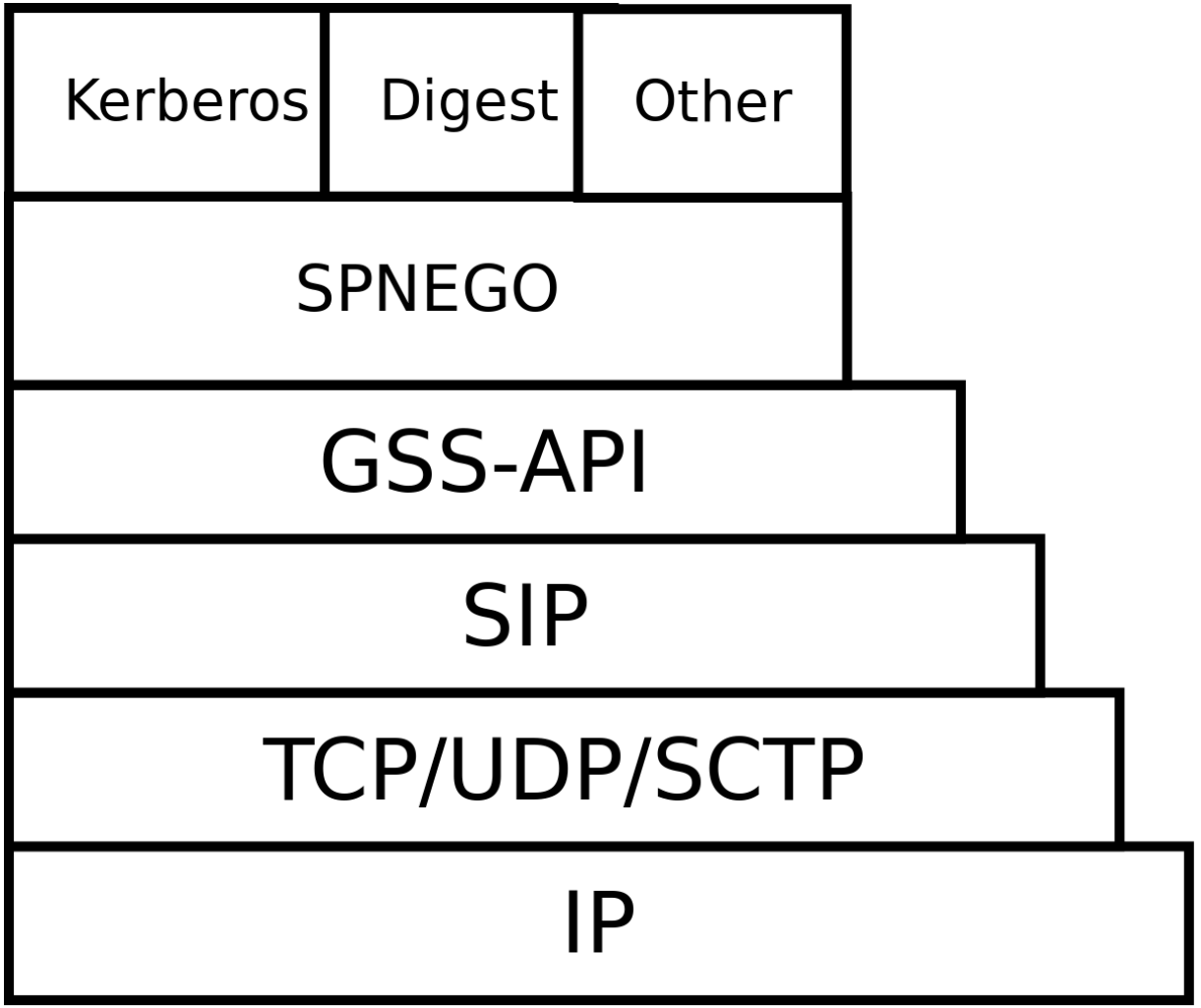
GSS-API

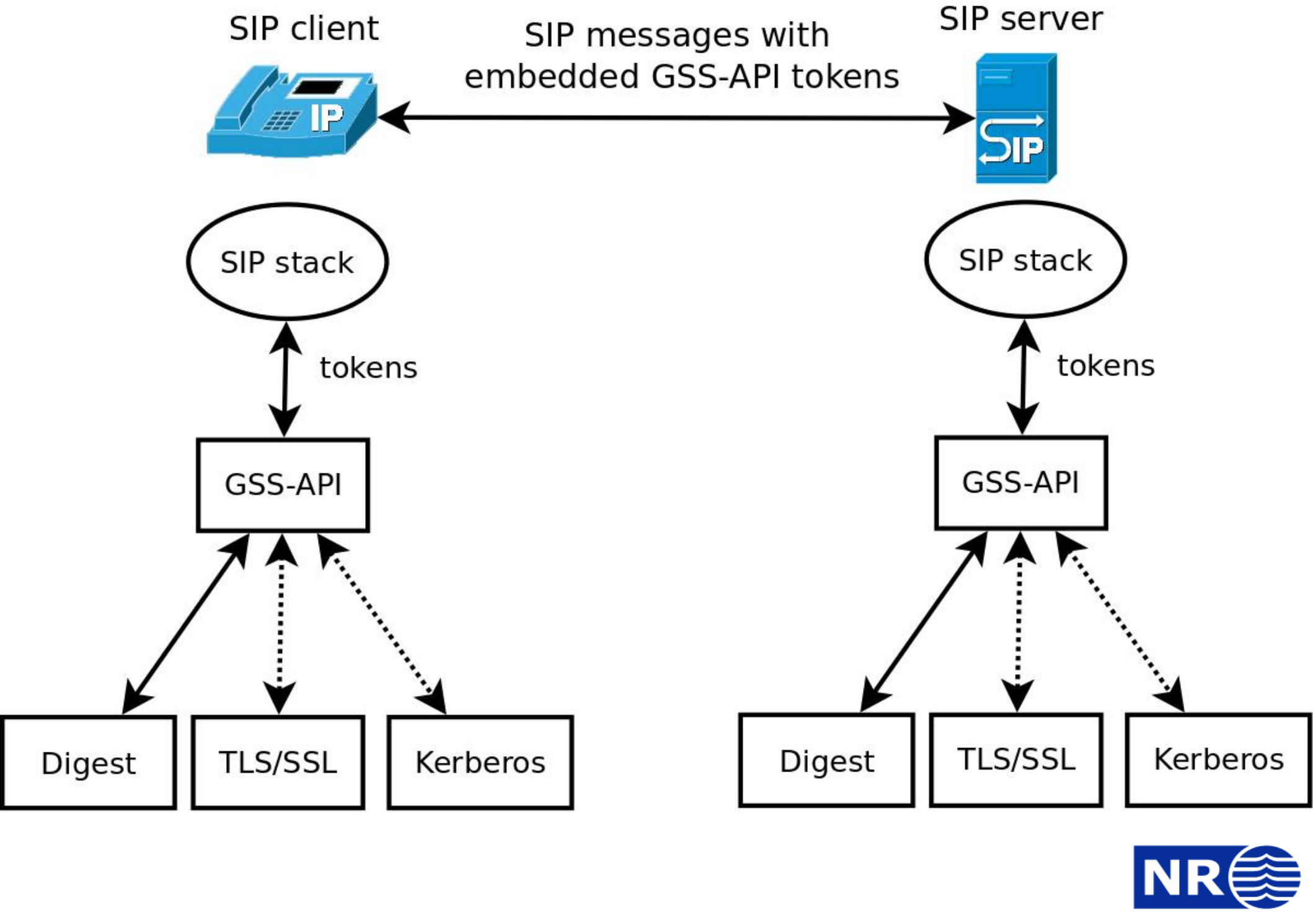


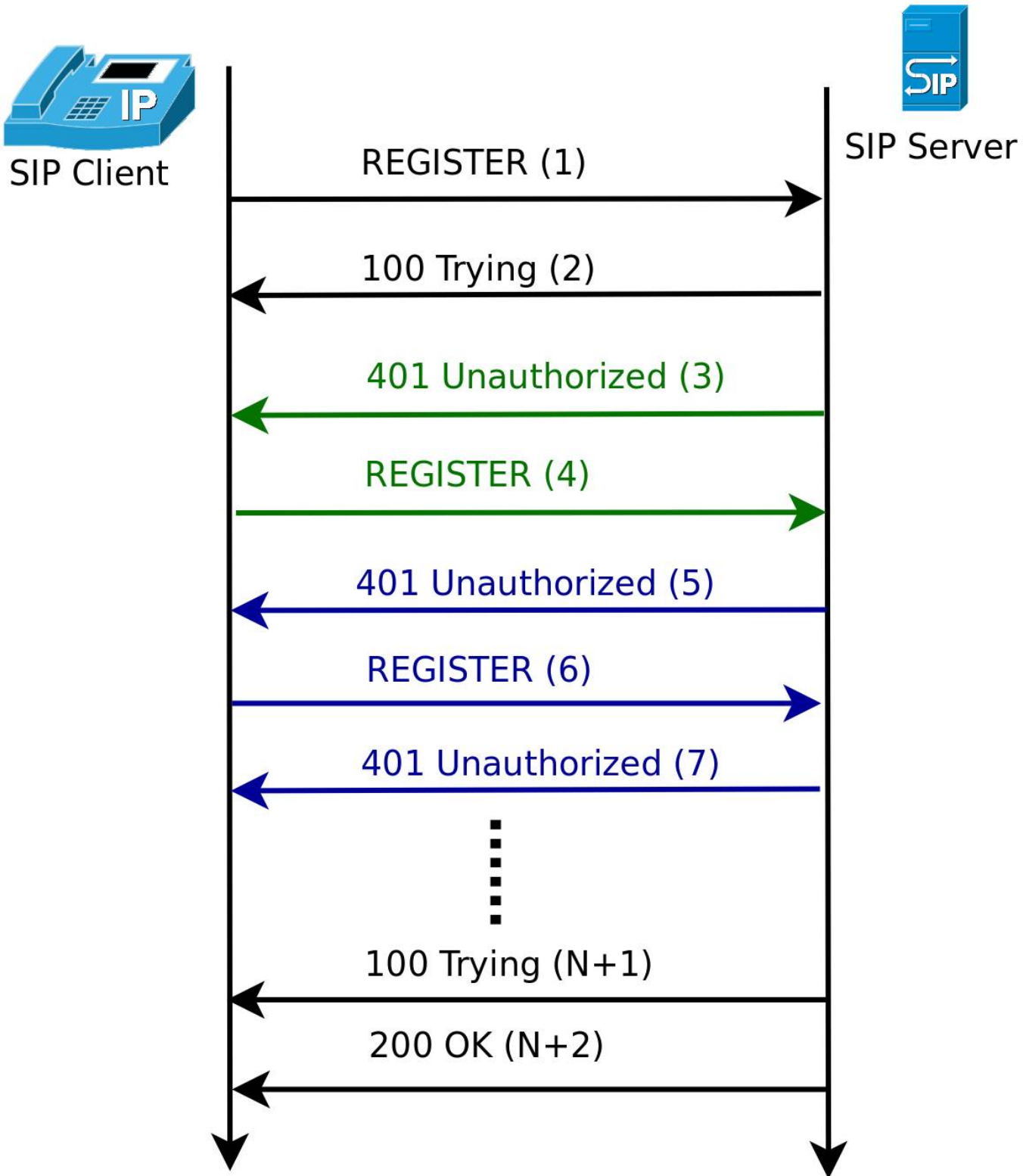
- Generic Security Services Application

  Program Interface = Interface for an application to access security services
- Mature and well-proven standard (RFC2743)
- NOT a communication protocol
  - Relies on the application (SIP) to pass data *tokens* between client and server
- Does NOT provide any security in itself
  - Relies on underlying security mechanisms
- GSS-API implementations (may) support different authentication methods
  - Digest
  - Kerberos
  - TLS
  - …
- All methods are *transparent* to the application

GSS-API stack




SIP client
SIP messages with
embedded GSS-API tokens
SIP server
IP
SIP
SIP stack
tokens
GSS-API
Digest
TLS/SSL
Kerberos
SIP stack
tokens
GSS-API
Digest
TLS/SSL
Kerberos


SIP Client
SIP Server
REGISTER (1)
100 Trying (2)
401 Unauthorized (3)
REGISTER (4)
401 Unauthorized (5)
REGISTER (6)
401 Unauthorized (7)
100 Trying (N+1)
200 OK (N+2)

SIP REGISTER

```
1.  REGISTER sip:CompanyA SIP/2.0
2.  Via: SIP/2.0/UDP
    192.168.1.102;branch=z9hG4bK32F3EC44EB23347BFB0D488459C69E4E
3.  From: Alice <sip:alice@CompanyA>;tag=1234648905
4.  To: Alice <sip:alice@CompanyA>
5.  Contact: "Alice" <sip:alice@192.168.1.102:5060>
6.  Call-ID: 2B6449C74C10D4F95006A6C034E79E8E@CompanyA
7.  CSeq: 19481 REGISTER
8.  User-Agent: PolycomSoundPointIP-SPIP_550-UA/3.1.2.0392
9.  Authorization: Digest
    username="alice",realm="asterisk",nonce="3b7a1395",response="ccbde1
    c3c129b3dcaa14a4d5e35519d7",uri="sip:CompanyA",algorithm=MD5
10. Max-Forwards: 70
11. Expires: 3600
12. Content-Length: 0
```

DAA

GSS-API token

```
1.  REGISTER sip:CompanyA SIP/2.0
2.  Via: SIP/2.0/UDP
    192.168.1.102;branch=z9hG4bK32F3EC44EB23347BFB0D488459C69E4E
3.  From: Alice <sip:alice@CompanyA>;tag=1234648905
4.  To: Alice <sip:alice@CompanyA>
5.  Contact: "Alice" <sip:alice@192.168.1.102:5060>
6.  Call-ID: 2B6449C74C10D4F95006A6C034E79E8E@CompanyA
7.  CSeq: 19481 REGISTER
8.  User-Agent: PolycomSoundPointIP-SPIP_550-UA/3.1.2.0392
9.  Authorization: GSSAPI
    token="0401000B06092A864886F712010202DACD139402AAF44350CDE32"
10. Max-Forwards: 70
11. Expires: 3600
12. Content-Length: 0
```

Conclusion

- Minimal changes to the SIP standard
- Support a range of different authentication methods
- Flexible – different implementations can support different authentication methods
- New authentication methods can be added later WITHOUT change to SIP
- Future work
  - Add an SIP extension to maintain backwards compatibility?
  - Require some authentication methods to be supported as standard? Which?
  - Vulnerable for a REGISTRATION attack?
  - Look into different GSS-API auth methods
  - Compare with SASL and SAML