

# A Talk about MS-SFU Kerberos Extensions:

Protocol Transition (S4U2Self) &  
Constrained Delegation (S4U2Proxy).

Isaac Boukris

SambaXP 2019

# Agenda

- Why S4U2Self is important for Samba.
- How does it work in local and cross realm.
- Recent CVEs related to S4U2Self.
- A couple of words on S4U2Proxy and RBCD.

# What is S4U2Self and why you should care

- Any server providing resources needs to have a mean to authenticate the user and to get a the list of groups the user is member of for authorization.
- Usually user's password is required to get user's token (Kerberos or NTLM).
- Any other authentication schemes (TLS, OTP, name it) can't get us a token.
- LDAP is the problem - not the solution.
- The consensus on Samba ML is that the best solution is S4U2Self.
  - Supports enterprise-names and and X509 certificates.
  - We can and should implement S4U2Self within winbind!

# How does it work

- PA-FOR-USER.
- PA-S4U-X509-USER - only implemented in MIT.
- Cross Realm S4U2Self - only implemented in MIT.
- TODOs:
  - Porting S4U code from MIT to Heimdal.
  - Add test coverage to Samba MIT build.

## MS-SFU 2.2.1 PA-FOR-USER:

The PA-FOR-USER  
padata value is  
protected with the  
help of a \*keyed\*  
checksum, as  
defined below...

```

  v tgs-req
    pvno: 5
    msg-type: krb-tgs-req (12)
    v padata: 4 items
      > PA-DATA PA-TGS-REQ
      > PA-DATA Unknown:222
      v PA-DATA PA-FOR-USER
        v padata-type: kRB5-PADATA-FOR-USER (129)
          v padata-value: 3049a0153013a00302010aa10c300a1b086973616163406e...
            v name
              name-type: kRB5-NT-ENTERPRISE-PRINCIPAL (10)
              v name-string: 1 item
                KerberosString: isaac@nd
              realm: ND.C
            v cksum
              cksumtype: cKSUMTYPE-HMAC-MD5 (-138)
              checksum: 34ac408820c75ae7dfa2f072614107be
              auth: Kerberos
          > PA-DATA PA-S4U-X509-USER
        v req-body
          Padding: 0
          > kdc-options: 40810000 (forwardable, renewable, canonicalize)
            realm: ND.C
          > sname
            till: 2018-12-04 09:32:32 (UTC)
            nonce: 1281739092
          > etype: 1 item

```

# CVEs related to S4U2Self

- Samba **CVE-2018-16853**: A user in a Samba AD domain can crash the MIT KDC by requesting an S4U2Self ticket.

<https://github.com/samba-team/samba/commit/6ab51b2af90f5dca11b8587b2a16215ab4497069>

<https://github.com/samba-team/samba/commit/6c453aeb0c771d14fe501e9a37d9f51b9403872b>

- MIT Kerberos **CVE-2018-20217**: Reachable Assertion. If an attacker can obtain a krbtgt ticket using an older encryption type (single-DES, triple-DES, or RC4), the attacker can crash the KDC by making an S4U2Self request.

<https://github.com/krb5/krb5/commit/94e5eda5bb94d1d44733a49c3d9b6d1e42c74def>

- Samba **CVE-2018-16860** / Microsoft **CVE-2019-0734**: S4U2Self with unkeyed checksums.

<https://github.com/samba-team/samba/commit/43958af1d50f0185e21e6cd74110c455ee8996af>

A python tool for intercepting and manipulating Kerberos packets, can be used to test KDC handling of unkeyed S4U2Self requests:

<https://github.com/iboukris/S4U/blob/master/kintercept/kintercept.py>