


```

Serans-MBA:~ seralahthan$ which openssl
/usr/local/bin/openssl
Serans-MBA:~ seralahthan$ openssl req -newkey rsa:2048 -nodes -keyout key.pem -x509 -days 365 -out certificate.pem
Generating a 2048 bit RSA private key
.....+++
.....+++
writing new private key to 'key.pem'
-----
You are about to be asked to enter information that will be incorporated
into your certificate request.
What you are about to enter is what is called a Distinguished Name or a DN.
There are quite a few fields but you can leave some blank
For some fields there will be a default value,
If you enter '.', the field will be left blank.
-----
Country Name (2 letter code) [AU]:SL
State or Province Name (full name) [Some-State]:Western
Locality Name (eg, city) []:Colombo
Organization Name (eg, company) [Internet Widgits Pty Ltd]:UOP
Organizational Unit Name (eg, section) []:Faculty of Engineering
Common Name (e.g. server FQDN or YOUR name) []:Seran
Email Address []:.
Serans-MBA:~ seralahthan$ openssl s_server -key key.pem -cert certificate.pem -accept 44330 -www
Using default temp DH parameters
ACCEPT
140735723783104:error:14094418:SSL routines:ssl3_read_bytes:tlsv1 alert unknown ca:ssl/record/rec_layer_s3.c:1470:SSL alert number 48
ACCEPT
ACCEPT
ACCEPT
ACCEPT
ACCEPT
ACCEPT

```

Fig. 7 shows generation of RSA private key certificate for connecting with the local server.

IV. CONCLUSIONS

In this work we implement the protocol P1 (eCK-secure and NAXOS trick free authenticated key exchange protocol) to be used with the widely-used OpenSSL cryptographic library. OpenSSL implementations are widely used with the real-world security protocol suites, such as Security Socket Layer and Transport Layer Security. According to our understanding, this is the first OpenSSL implementation of an eCK-secure key exchange protocol. Thus, our work opens up the direction to use the recent advancements of cryptography for betterment of the real-world Internet communication.

As a future work, we aim to implement a leakage-resilient AKE protocols [9], [13]-[15] for OpenSSL, which is resilient to wide range of side-channel attacks, in addition to eCK security.

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