

# Mail transfer agent (2)

Tykushin Anatoly, a.tykushin@innopolis.ru, MSIT-SNE

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## 1 Mailing loops

### 1.1 Sending email

To create mail loops every member of a loop had to create an alias to the neighbour, e.g.

```
tyvision    horn@st2.os3.su
```

It is my configuration, written in file `/etc/mail/aliases`. After that `sendmailconfig` utility was launched to enable changes. The result of mail loop is shown in appendix A.

As you can see in logs, message is going around the circle, and stopped at st2.os3.su.

### 1.2 Changing behaviour of MTA in working loops

One of them is to use **FEATURE(conncontrol)** allows you to use the access database to control the number of simultaneous connections another machine may have to your server. \* The number of simultaneous connections allowed each interval is based on the setting of the `ConnectionRateWindowSize` option, which defaults to 60 seconds. So, for example, if you want to reject a host that has more than 10 simultaneous connections to your server (sometime in the past 60 seconds), where that host has the IP address, you would put the following into your access database source file:

```
ClientRate <ip_address>: 10          # where 10 - is a number of connections
```

If number of connections will be more than 10 (in a 60sec) so they will be refused If not to set IP address - this rule will be common for all IP's.

## 2 Virtual Domains

### 2.1 Create a new subdomain within your domain

To create a new subdomain we have to add an MX record to the zone file. I've created subdomain called **resmail** and set 2nd priority after main mailserver record. Here you can see this record.

```
resmail.st5.os3.su. 1800 IN MX 15 mail.st5.os3.su.
```

### 2.2 Handling virtual domains

The following sequence have to be done:

- enable feature **virtusertable** in `/etc/mail/sendmail.mc` file
- create and fill `/etc/mail/virtusertable` file with records about virtual users

```
myboy@resmail.st5.os3.su      tyvision
myboy@st5.os3.su              tyvision
```

- compile configurations using **sendmailconfig** command

### 2.3 Show test results

Using my @innopolis.ru mailbox I've sent messages for both myboy@resmail.st5.os3.su and myboy@st5.os3.su. As we can see in screenshots of mutt mail agent (figures 1 and 2

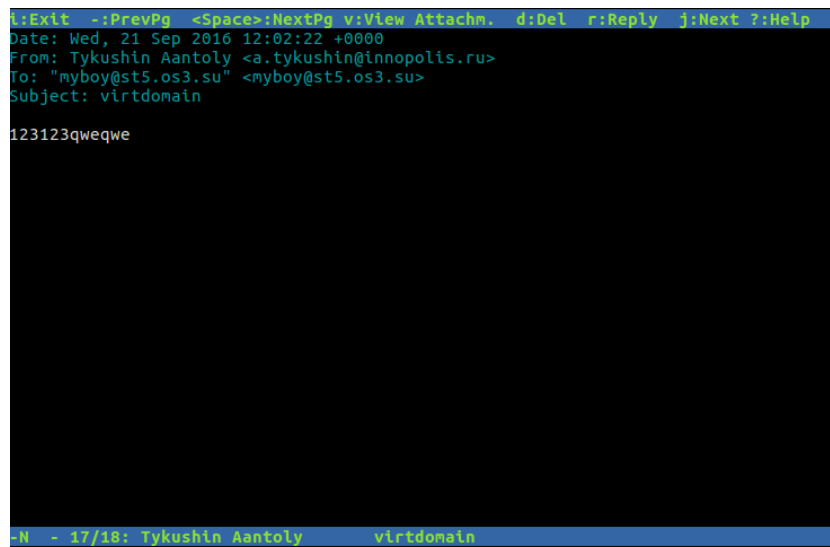


Figure 1: Message for myboy@st5.os3.su

## 3 SPAM and Security

### 3.1 Advantages and disadvantages of SPF and DomainKeys Identified Mail (DKIM)

There are many authentication methods, but there isn't a single one that's the best. SPF and SenderID allow a domain owner to add a file or record on the server that the recipient server cross-checks. These are easy to implement, but some suggest they aren't as secure. DKIM and DomainKeys embed information within the email, making it harder to forge (but they can also be harder to implement for senders and receivers).

### 3.2 What would you choose at a first glance and why?

I've chosen DKIM because of it's availability of improved forge-protection. Also in point of implementation, spf is RAATHER easier, but we don't look for an easy way, isn't it?

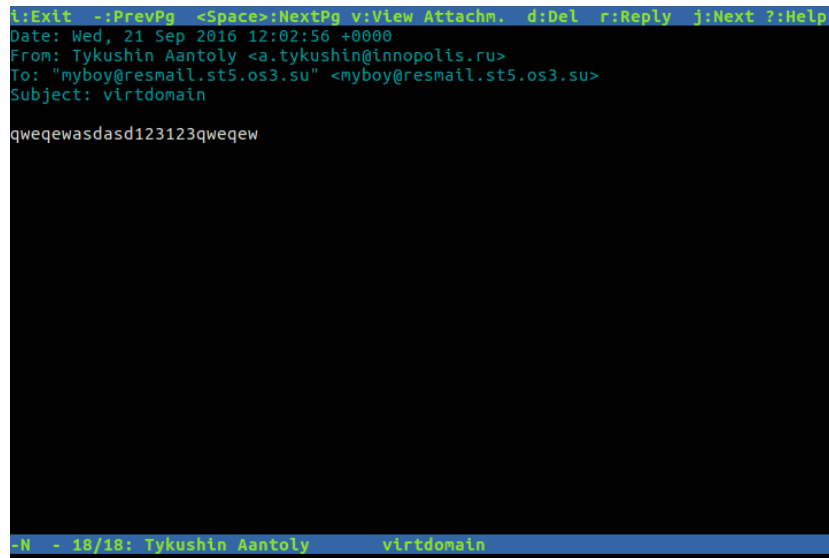


Figure 2: Message for mybot@resmail.st5.os3.su

### 3.3 Installing spf and opendkim

```
sudo apt-get install opendkim
```

```
echo "127.0.0.1 st5.os3.su st4.os3.su st3.os3.su st2.os3.su" > /etc/opendkim/TrustedHosts
```

```
echo "@st5.os3.su default._domainkey.st5.os3.su" > /etc/opendkim/SigningTable
```

```
echo "default._domainkey.st5.os3.su st5.os3.su:default:/etc/opendkim/keys/st5.os3.su/default.private" > /etc
```

```
subl /etc/opendkim.conf # fix the config
```

```

OversignHeaders      From

TrustAnchorFile      /usr/local/etc/unbound/root.key
AutoRestart          Yes
AutoRestartRate      10/1h
UMask                 002
Syslog               yes
SyslogSuccess        Yes
LogWhy               Yes

Canonicalization      relaxed/simple

ExternalIgnoreList    refile:/etc/opendkim/TrustedHosts
InternalHosts         refile:/etc/opendkim/TrustedHosts
KeyTable              refile:/etc/opendkim/KeyTable
SigningTable          refile:/etc/opendkim/SigningTable
Mode                  sv
PidFile               /var/run/opendkim/opendkim.pid
SignatureAlgorithm     rsa-sha256

UserID                opendkim:opendkim

Socket                inet:23412@localhost

Domain                st5.os3.su
Selector              default
KeyTable              refile:/etc/opendkim/KeyTable
SigningTable          refile:/etc/opendkim/SigningTable
ExternalIgnoreList    refile:/etc/opendkim/TrustedHosts
InternalHosts         refile:/etc/opendkim/TrustedHosts

```

```

sudo apt install opendkim-tools # install utility for key generation

sudo opendkim-genkey -D /etc/opendkim/key/st5.os3.su/ -d st5.os3.su -s default # generate keys: 2
new files created: default.txt and default.private

cat /etc/opendkim/keys/st5.os3.su/default.txt >> /etc/nsd/zones/st5.os3.su.zone # add record from
file mail.txt to the zonefile

echo "st5.os3.su. 1800 IN TXT "v=spf1 ip4:188.130.155.38 all" >> /etc/nsd/zones/st5.os3.su.zone
# add SPF signature for the st5.os3.su

./resign.sh # this script resigned the zone (because of DNSSEC)

sudo service nsd restart # restart dns service to apply new txt record

dig default._domainkey.st5.os3.su TXT # check if it's all right
The reply:

```

```

; <<>> DiG 9.10.3-P4-Ubuntu <<>> txt default._domainkey.st5.os3.su +dnssec
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 28036
;; flags: qr aa rd; QUERY: 1, ANSWER: 2, AUTHORITY: 3, ADDITIONAL: 3
;; WARNING: recursion requested but not available

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags: do; udp: 4096
;; QUESTION SECTION:
;default._domainkey.st5.os3.su. IN TXT

;; ANSWER SECTION:

default._domainkey.st5.os3.su. 1800 IN TXT "v=DKIM1; k=rsa; " ""
"p=MIGfMAOGCSqGSIb3DQEBAQUAA4GNADCBiQKBgQDHoFp3oshKGuGM/riWF1FzaA/
z8e+u02qwwsXoUXrbkWPUF6jMiC7SMQJRe1/TE/uzfd83mVVtbMsROtdOymu36vkD7
UjlJy0V9jEFbbw5QuFZA0gEG+Jhi9VdBYRclYpatS16Nc+EeUcovCr2glz2Ls
/+V2DaWdvYu716ncKRawIDAQAB"

default._domainkey.st5.os3.su. 1800 IN RRSIG TXT 12 5 1800 20161025140330
20160927140330 55325 st5.os3.su. Mg6XF7tD11ZRZDC4AQeLK446PmNMrMGMz7o6Qq20ZzqbhoiqrHSZW57b
V0ceAKiV/dDSRjkafdp09VZ3JUc62w==
56:24 MSK 2016
;; MSG SIZE rcvd: 351

... other sections ...

;; Query time: 0 msec
;; SERVER: 188.130.155.38#53(188.130.155.38)
;; WHEN: Tue Sep 27 19:40:19 MSK 2016
;; MSG SIZE rcvd: 673

```

```

sudo service opendkim restart # apply changes: catch errors

journalctl -xe # try to know what went wrong

```

```

Sep 22 18:58:56 st5.os3.su opendkim[30778]: /etc/mail/dkim.key:
key data is not secure: /etc/mail is writeable and owned by uid 123
which is not the executing uid (125) or the superuser      # that's it!!!!

Sep 22 18:58:56 st5.os3.su opendkim[30778]: opendkim: /etc/opendkim.conf:
/etc/mail is writeable and owned by uid 123
which is not the executing uid (125) or the superuser

```

```
Sep 22 18:58:56 st5.os3.su systemd[1]: opendkim.service: Control process exited,
code=exited status=78
```

```
Sep 22 18:58:56 st5.os3.su systemd[1]: Failed to start DomainKeys Identified Mail (DKIM) Milter.
Sep 22 18:58:56 st5.os3.su systemd[1]: opendkim.service: Unit entered failed state.
Sep 22 18:58:56 st5.os3.su systemd[1]: opendkim.service: Failed with result 'exit-code'.
```

**sudo addgroup opendkim**

**sudo adduser opendkim opendkim** # add group and user opendkim

**sudo chgrp opendkim /etc/opendkim/key/st5.os3.su/** # fix the problem

**sudo chgrp opendkim /etc/opendkim/key/st5.os3.su/default.private**

**sudo chmod 0640 /etc/opendkim/key/st5.os3.su/default.private** # set permissions

**sudo service opendkim restart** # apply changes

**journalctl -xe** # check if some any error committed, but it's okay

This configuration still had problems. After 3 days I've found that in a magicway option **-x /etc/opendkim.conf** didn't work, I mean, configuration was loading from the **/etc/default/opendkim** file.

**subl /etc/default/opendkim** # Adding couple records to this file helped me a lot

```
SOCKET="inet:23412@localhost"
ExternalIgnoreList refile:/etc/opendkim/TrustedHosts
InternalHosts      refile:/etc/opendkim/TrustedHosts
KeyTable            refile:/etc/opendkim/KeyTable
SigningTable        refile:/etc/opendkim/SigningTable
```

Here's what I've got after

```
----- OUTGOING MESSAGE -----
(inserting DKIM-signature in it)
```

```
Sep 27 18:49:30 st5 sm-mta[3278]: u8RFnTnn003278: Milter insert (1): header:
```

```
DKIM-Signature: v=1; a=rsa-sha256; c=relaxed/simple;
d=st5.os3.su;\n\tts=default; t=1474991370;\n\ttbh=0CJ1Yvy7qpc1PZcis8+1CuN7W/zEsgYDgUBPDdBxtrE=;
\n\tth=Date:From:To:Subject:From;\n
\tb=pJ1Mpp5jDBQiAcNwhEO2zlu4CxfxSZrPWpr6Qq/+6TyloWFbAHYMLQU5TzI6XJAqB\n\t
0iBQq4G+zQIDxQwrmBlJrJfSpNYMiM5XpZ56PUWa/KGrpp6EOWvScRU8BI1MXjmv\n\t
lo2sVgKQmHw0I8cv77kUZyuIutHmrXOf2L7c25ig=
```

```
----- INCOMING MESSAGE -----
(fetching DKIM-signature in it)
```

```
Sep 27 18:49:48 st5 sm-mta[3288]: u8RFnixa003288: Milter insert (1): header: Authentication-Results:
st5.os3.su;\n\ttdkim=pass (2048-bit key;
unprotected) header.d=port25.com header.i=auth-results@verifier.port25.com header.b=MSMoNX7i;\n
\ttdkim-atps=neutral
```

```
----- INCOMING MESSAGE CONTAINS -----
```

```
Date: Tue, 27 Sep 2016 11:49:38 -0400
From: auth-results@verifier.port25.com
To: tyvision@st5.os3.su
Subject: Authentication Report
```

Thank you for using the verifier,

The Port25 Solutions, Inc. team

=====

Summary of Results

=====

SPF check: pass  
DomainKeys check: neutral  
DKIM check: pass  
SpamAssassin check: ham

=====

Details:

=====

HELO hostname: st5.os3.su  
Source IP: 188.130.155.38  
mail-from: tyvision@st5.os3.su

-----

SPF check details:

-----

Result: pass  
ID(s) verified: smtp.mailfrom=tyvision@st5.os3.su  
DNS record(s):  
st5.os3.su. SPF (no records)  
st5.os3.su. 370 IN TXT "v=spf1 ip4:188.130.155.38 ~all"

-----

DomainKeys check details:

-----

Result: neutral (message not signed)  
ID(s) verified: header.From=tyvision@st5.os3.su  
DNS record(s):

-----

DKIM check details:

-----

Result: pass (matches From: tyvision@st5.os3.su)  
ID(s) verified: header.d=st5.os3.su  
Canonicalized Headers:  
date:Tue,'20'27'20'Sep'20'2016'20'18:49:29'20'+0300'0D''0A'  
from:tyvision'20'<tyvision@st5.os3.su>'0D''0A'  
to:check-auth@verifier.port25.com'0D''0A'  
subject:1'0D''0A'  
dkim-signature:v=1;'20'a=rsa-sha256;'20'c=relaxed/simple;'20'd=st5.os3.su;  
'20's=default;'20't=1474991370;'20'b  
+h=0CJ1Yvy7qpc1PZcis8+1CuN7W/zEsgYDgUBPDdBxtrE='; '20'h=Date:From:To:Subject:From;  
'20'b=

Canonicalized Body:

i'0D''0A'

DNS record(s):

default.\_domainkey.st5.os3.su. 1800 IN TXT  
"v=DKIM1; k=rsa; p=MIGfMA0GCSqGSIb3DQEBAQUAA4GNADCBiQKBgQDH0Fp3oshK  
+GuGM/riWf1FzaA/z8e+u02qwwsXoUXrbkWPUF6jMiC7SMQJRe1/TE/  
uzfd83mVVtbMsR0Td0ymu36vkD7Uj1Jy0V9jEFbbw5QuFZA0gEG+Jhi9VdB  
+YRclYpatS16Nc+EeUcovCr2glz2Ls/+V2DaWdvYu716ncKRawIDAQAB"

Public key used for verification: default.\_domainkey.st5.os3.su (1024 bits)

----- other sections -----

# Appendices

## A Mailing Loops

### A.1 Sendmail MTA (st5.os3.su) log

Sep 20 14:26:54 st5 sm-mta[5239]: u8KBQrsm005239: from=<a.bakhtin@innopolis.ru>, size=2510, class=0, nrcpts=1, msgid=<a4d3db9042d346a9a7fb3b4946caea8a@EXMB02.edu.innopolis.ru>, proto=ESMTP, daemon=MTA-v4, relay=mail.st3.os3.su [188.130.155.36]

Sep 20 14:26:55 st5 sm-mta[5240]: STARTTLS=client, relay=mail.st2.os3.su., version=TLSv1.2, verify=FAIL, cipher=ECDHE-RSA-AES256-GCM-SHA384, bits=256/256

Sep 20 14:26:58 st5 sm-mta[5240]: u8KBQrsm005239: to=horn@st2.os3.su, delay=00:00:04, xdelay=00:00:04, mailer=esmtpl, pri=32696, relay=mail.st2.os3.su. [188.130.155.35], dsn=2.0.0, stat=Sent (OK id=1bmJCS-00047B-1J)

Sep 20 14:27:00 st5 sm-mta[5245]: u8KBQxTi005245: from=<a.bakhtin@innopolis.ru>, size=3323, class=0, nrcpts=1, msgid=<a4d3db9042d346a9a7fb3b4946caea8a@EXMB02.edu.innopolis.ru>, proto=ESMTP, daemon=MTA-v4, relay=mail.st3.os3.su [188.130.155.36]

Sep 20 14:27:01 st5 sm-mta[5246]: STARTTLS=client, relay=mail.st2.os3.su., version=TLSv1.2, verify=FAIL, cipher=ECDHE-RSA-AES256-GCM-SHA384, bits=256/256

Sep 20 14:27:04 st5 sm-mta[5246]: u8KBQxTi005245: to=horn@st2.os3.su, delay=00:00:04, xdelay=00:00:03, mailer=esmtpl, pri=33504, relay=mail.st2.os3.su. [188.130.155.35], dsn=2.0.0, stat=Sent (OK id=1bmJCX-00047i-WB)

Sep 20 14:27:07 st5 sm-mta[5247]: u8KBR515005247: from=<a.bakhtin@innopolis.ru>, size=4136, class=0, nrcpts=1, msgid=<a4d3db9042d346a9a7fb3b4946caea8a@EXMB02.edu.innopolis.ru>, proto=ESMTP, daemon=MTA-v4, relay=mail.st3.os3.su [188.130.155.36]

Sep 20 14:27:07 st5 sm-mta[5248]: STARTTLS=client, relay=mail.st2.os3.su., version=TLSv1.2, verify=FAIL, cipher=ECDHE-RSA-AES256-GCM-SHA384, bits=256/256

Sep 20 14:27:10 st5 sm-mta[5248]: u8KBR515005247: to=horn@st2.os3.su, delay=00:00:03, xdelay=00:00:03, mailer=esmtpl, pri=34312, relay=mail.st2.os3.su. [188.130.155.35], dsn=2.0.0, stat=Sent (OK id=1bmJCe-00048D-3c)

Sep 20 14:27:12 st5 sm-mta[5249]: u8KBRBQG005249: from=<a.bakhtin@innopolis.ru>, size=4949, class=0, nrcpts=1, msgid=<a4d3db9042d346a9a7fb3b4946caea8a@EXMB02.edu.innopolis.ru>, proto=ESMTP, daemon=MTA-v4, relay=mail.st3.os3.su [188.130.155.36]

Sep 20 14:27:13 st5 sm-mta[5250]: STARTTLS=client, relay=mail.st2.os3.su., version=TLSv1.2, verify=FAIL, cipher=ECDHE-RSA-AES256-GCM-SHA384, bits=256/256

Sep 20 14:27:16 st5 sm-mta[5250]: u8KBRBQG005249: to=horn@st2.os3.su, delay=00:00:04, xdelay=00:00:04, mailer=esmtpl, pri=35120, relay=mail.st2.os3.su. [188.130.155.35], dsn=2.0.0, stat=Sent (OK id=1bmJCj-00048j-FW)

Sep 20 14:27:18 st5 sm-mta[5252]: u8KBRG57005252: from=<a.bakhtin@innopolis.ru>, size=5762, class=0, nrcpts=1, msgid=<a4d3db9042d346a9a7fb3b4946caea8a@EXMB02.edu.innopolis.ru>, proto=ESMTP, daemon=MTA-v4, relay=mail.st3.os3.su [188.130.155.36]

Sep 20 14:27:18 st5 sm-mta[5253]: STARTTLS=client, relay=mail.st2.os3.su., version=TLSv1.2, verify=FAIL, cipher=ECDHE-RSA-AES256-GCM-SHA384, bits=256/256

Sep 20 14:27:22 st5 sm-mta[5253]: u8KBRG57005252: to=horn@st2.os3.su, delay=00:00:04, xdelay=00:00:04, mailer=esmtpl, pri=35928, relay=mail.st2.os3.su. [188.130.155.35], dsn=2.0.0, stat=Sent (OK id=1bmJCp-000497-DF)



Sep 20 14:27:23 st5 sm-mta[5254]: u8KBRMtP005254: from=<a.bakhtin@innopolis.ru>, size=6575, class=0, nrcpts=1, msgid=<a4d3db9042d346a9a7fb3b4946caea8a@EXMB02.edu.innopolis.ru>, proto=ESMTP, daemon=MTA-v4, relay=mail.st3.os3.su [188.130.155.36]

Sep 20 14:27:24 st5 sm-mta[5256]: STARTTLS=client, relay=mail.st2.os3.su., version=TLSv1.2, verify=FAIL, cipher=ECDHE-RSA-AES256-GCM-SHA384, bits=256/256

Sep 20 14:27:27 st5 sm-mta[5256]: u8KBRMtP005254: to=horn@st2.os3.su, delay=00:00:04, xdelay=00:00:03, mailer=esmtplib, pri=36736, relay=mail.st2.os3.su. [188.130.155.35], dsn=2.0.0, stat=Sent (OK id=1bmJCc-00049c-KE)

Sep 20 14:27:29 st5 sm-mta[5257]: u8KBRRST005257: from=<a.bakhtin@innopolis.ru>, size=7388, class=0, nrcpts=1, msgid=<a4d3db9042d346a9a7fb3b4946caea8a@EXMB02.edu.innopolis.ru>, proto=ESMTP, daemon=MTA-v4, relay=mail.st3.os3.su [188.130.155.36]

Sep 20 14:27:29 st5 sm-mta[5258]: STARTTLS=client, relay=mail.st2.os3.su., version=TLSv1.2, verify=FAIL, cipher=ECDHE-RSA-AES256-GCM-SHA384, bits=256/256

Sep 20 14:27:32 st5 sm-mta[5258]: u8KBRRST005257: to=horn@st2.os3.su, delay=00:00:04, xdelay=00:00:03, mailer=esmtplib, pri=37544, relay=mail.st2.os3.su. [188.130.155.35], dsn=2.0.0, stat=Sent (OK id=1bmJCz-0004A8-NV)

Sep 20 14:27:34 st5 sm-mta[5274]: u8KBRXGZ005274: from=<a.bakhtin@innopolis.ru>, size=8201, class=0, nrcpts=1, msgid=<a4d3db9042d346a9a7fb3b4946caea8a@EXMB02.edu.innopolis.ru>, proto=ESMTP, daemon=MTA-v4, relay=mail.st3.os3.su [188.130.155.36]

Sep 20 14:27:34 st5 sm-mta[5277]: STARTTLS=client, relay=mail.st2.os3.su., version=TLSv1.2, verify=FAIL, cipher=ECDHE-RSA-AES256-GCM-SHA384, bits=256/256

Sep 20 14:27:40 st5 sm-mta[5277]: u8KBRXGZ005274: to=horn@st2.os3.su, delay=00:00:06, xdelay=00:00:06, mailer=esmtplib, pri=38352, relay=mail.st2.os3.su. [188.130.155.35], dsn=2.0.0, stat=Sent (OK id=1bmJD4-0004AU-SH)

Sep 20 14:27:41 st5 sm-mta[5285]: u8KBReDI005285: from=<a.bakhtin@innopolis.ru>, size=9014, class=0, nrcpts=1, msgid=<a4d3db9042d346a9a7fb3b4946caea8a@EXMB02.edu.innopolis.ru>, proto=ESMTP, daemon=MTA-v4, relay=mail.st3.os3.su [188.130.155.36]

Sep 20 14:27:42 st5 sm-mta[5289]: STARTTLS=client, relay=mail.st2.os3.su., version=TLSv1.2, verify=FAIL, cipher=ECDHE-RSA-AES256-GCM-SHA384, bits=256/256

Sep 20 14:27:45 st5 sm-mta[5289]: u8KBReDI005285: to=horn@st2.os3.su, delay=00:00:04, xdelay=00:00:03, mailer=esmtplib, pri=39160, relay=mail.st2.os3.su. [188.130.155.35], dsn=2.0.0, stat=Sent (OK id=1bmJDC-0004B9-Lx)

Sep 20 14:27:47 st5 sm-mta[5290]: u8KBRjx8005290: from=<a.bakhtin@innopolis.ru>, size=9827, class=0, nrcpts=1, msgid=<a4d3db9042d346a9a7fb3b4946caea8a@EXMB02.edu.innopolis.ru>, proto=ESMTP, daemon=MTA-v4, relay=mail.st3.os3.su [188.130.155.36]

Sep 20 14:27:47 st5 sm-mta[5291]: STARTTLS=client, relay=mail.st2.os3.su., version=TLSv1.2, verify=FAIL, cipher=ECDHE-RSA-AES256-GCM-SHA384, bits=256/256

Sep 20 14:27:50 st5 sm-mta[5291]: u8KBRjx8005290: to=horn@st2.os3.su, delay=00:00:03, xdelay=00:00:03, mailer=esmtplib, pri=39968, relay=mail.st2.os3.su. [188.130.155.35], dsn=2.0.0, stat=Sent (OK id=1bmJDH-0004BW-Mm)

## A.2 Postfix MTA (st3.os3.su) log

Sep 20 14:27:37 a-pc postfix/qmgr[4165]: A06C636C0528: from=<a.bakhtin@innopolis.ru>, size=5879, nrcpt=1 (queue active)

Sep 20 14:27:37 a-pc postfix/smtpd[4456]: disconnect from mail.st2.os3.su[188.130.155.35] ehlo=1 mail=1 rcpt=1 data=1 quit=1 commands=5

Sep 20 14:27:39 a-pc postfix/smtp[4460]: A06C636C0528: to=<tyvision@st5.os3.su>, orig\_to=<mail@st3.os3.su>, relay=mail.st5.os3.su[188.130.155.38]:25, delay=1.7, delays=0.07/0/1.4/0.23, dsn=2.0.0, status=sent (250 2.0.0 u8KBRG57005252 Message accepted for delivery)

Sep 20 14:27:39 a-pc postfix/qmgr[4165]: A06C636C0528: removed

Sep 20 14:27:43 a-pc postfix/smtpd[4456]: connect from mail.st2.os3.su[188.130.155.35]

Sep 20 14:27:43 a-pc postfix/smtpd[4456]: 83E8E36C0528: client=mail.st2.os3.su[188.130.155.35]

Sep 20 14:27:43 a-pc postfix/cleanup[4459]: 83E8E36C0528: message-id=<a4d3db9042d346a9a7fb3b4946caea8a@EXMB02.edu.innopolis.ru>

Sep 20 14:27:43 a-pc postfix/qmgr[4165]: 83E8E36C0528: from=<a.bakhtin@innopolis.ru>, size=6706, nrcpt=1 (queue active)

Sep 20 14:27:43 a-pc postfix/smtpd[4456]: disconnect from mail.st2.os3.su[188.130.155.35] ehlo=1 mail=1 rcpt=1 data=1 quit=1 commands=5

Sep 20 14:27:45 a-pc postfix/smtp[4460]: 83E8E36C0528: to=<tyvision@st5.os3.su>, orig\_to=<mail@st3.os3.su>, relay=mail.st5.os3.su[188.130.155.38]:25, delay=1.6, delays=0.04/0/1.4/0.19, dsn=2.0.0, status=sent (250 2.0.0 u8KBRMtP005254 Message accepted for delivery)

Sep 20 14:27:45 a-pc postfix/qmgr[4165]: 83E8E36C0528: removed

Sep 20 14:27:48 a-pc postfix/smtpd[4456]: connect from mail.st2.os3.su[188.130.155.35]

Sep 20 14:27:48 a-pc postfix/smtpd[4456]: ADF8136C0528: client=mail.st2.os3.su[188.130.155.35]

Sep 20 14:27:48 a-pc postfix/cleanup[4459]: ADF8136C0528: message-id=<a4d3db9042d346a9a7fb3b4946caea8a@EXMB02.edu.innopolis.ru>

Sep 20 14:27:48 a-pc postfix/qmgr[4165]: ADF8136C0528: from=<a.bakhtin@innopolis.ru>, size=7533, nrcpt=1 (queue active)

Sep 20 14:27:48 a-pc postfix/smtpd[4456]: disconnect from mail.st2.os3.su[188.130.155.35] ehlo=1 mail=1 rcpt=1 data=1 quit=1 commands=5

Sep 20 14:27:50 a-pc postfix/smtp[4460]: ADF8136C0528: to=<tyvision@st5.os3.su>, orig\_to=<mail@st3.os3.su>, relay=mail.st5.os3.su[188.130.155.38]:25, delay=1.5, delays=0.05/0/1.3/0.17, dsn=2.0.0, status=sent (250 2.0.0 u8KBRRST005257 Message accepted for delivery)

Sep 20 14:27:50 a-pc postfix/qmgr[4165]: ADF8136C0528: removed

Sep 20 14:27:53 a-pc postfix/smtpd[4456]: connect from mail.st2.os3.su[188.130.155.35]

Sep 20 14:27:53 a-pc postfix/smtpd[4456]: BA02C36C0528: client=mail.st2.os3.su[188.130.155.35]

Sep 20 14:27:53 a-pc postfix/cleanup[4459]: BA02C36C0528: message-id=<a4d3db9042d346a9a7fb3b4946caea8a@EXMB02.edu.innopolis.ru>

Sep 20 14:27:53 a-pc postfix/qmgr[4165]: BA02C36C0528: from=<a.bakhtin@innopolis.ru>, size=8360, nrcpt=1 (queue active)

Sep 20 14:27:53 a-pc postfix/smtpd[4456]: disconnect from mail.st2.os3.su[188.130.155.35] ehlo=1 mail=1

rcpt=1 data=1 quit=1 commands=5

Sep 20 14:27:55 a-pc postfix/smtp[4460]: BA02C36C0528: to=<tyvision@st5.os3.su>, orig\_to=<mail@st3.os3.su>, relay=mail.st5.os3.su[188.130.155.38]:25, delay=1.6, delays=0.08/0/1.4/0.14, dsn=2.0.0, status=sent (250 2.0.0 u8KBRXGZ005274 Message accepted for delivery)

Sep 20 14:27:55 a-pc postfix/qmgr[4165]: BA02C36C0528: removed

Sep 20 14:28:01 a-pc postfix/smtpd[4456]: connect from mail.st2.os3.su[188.130.155.35]

Sep 20 14:28:01 a-pc postfix/smtpd[4456]: A1EE836C0528: client=mail.st2.os3.su[188.130.155.35]

Sep 20 14:28:01 a-pc postfix/cleanup[4459]: A1EE836C0528: message-id=<a4d3db9042d346a9a7fb3b4946caea8a@EXMB02.edu.innopolis.ru>

Sep 20 14:28:01 a-pc postfix/qmgr[4165]: A1EE836C0528: from=<a.bakhtin@innopolis.ru>, size=9187, nrcpt=1 (queue active)

Sep 20 14:28:01 a-pc postfix/smtpd[4456]: disconnect from mail.st2.os3.su[188.130.155.35] ehlo=1 mail=1 rcpt=1 data=1 quit=1 commands=5

Sep 20 14:28:03 a-pc postfix/smtp[4460]: A1EE836C0528: to=<tyvision@st5.os3.su>, orig\_to=<mail@st3.os3.su>, relay=mail.st5.os3.su[188.130.155.38]:25, delay=1.5, delays=0.04/0/1.3/0.16, dsn=2.0.0, status=sent (250 2.0.0 u8KBRxEDI005285 Message accepted for delivery)

Sep 20 14:28:03 a-pc postfix/qmgr[4165]: A1EE836C0528: removed

Sep 20 14:28:06 a-pc postfix/smtpd[4456]: connect from mail.st2.os3.su[188.130.155.35]

Sep 20 14:28:06 a-pc postfix/smtpd[4456]: B180136C0528: client=mail.st2.os3.su[188.130.155.35]

Sep 20 14:28:06 a-pc postfix/cleanup[4459]: B180136C0528: message-id=<a4d3db9042d346a9a7fb3b4946caea8a@EXMB02.edu.innopolis.ru>

Sep 20 14:28:06 a-pc postfix/qmgr[4165]: B180136C0528: from=<a.bakhtin@innopolis.ru>, size=10014, nrcpt=1 (queue active)

Sep 20 14:28:06 a-pc postfix/smtpd[4456]: disconnect from mail.st2.os3.su[188.130.155.35] ehlo=1 mail=1 rcpt=1 data=1 quit=1 commands=5

Sep 20 14:28:08 a-pc postfix/smtp[4460]: B180136C0528: to=<tyvision@st5.os3.su>, orig\_to=<mail@st3.os3.su>, relay=mail.st5.os3.su[188.130.155.38]:25, delay=1.6, delays=0.1/0/1.3/0.17, dsn=2.0.0, status=sent (250 2.0.0 u8KBRjx8005290 Message accepted for delivery)

Sep 20 14:28:08 a-pc postfix/qmgr[4165]: B180136C0528: removed

### A.3 Exim MTA (st2.os3.su) log

2016-09-20 14:26:48 1bmJCK-00046f-KD DKIM: d=innopolis.ru s=unimail1 c=simple/simple a=rsa-sha256 b=2048 t=1474370807 [verification succeeded]

2016-09-20 14:26:48 1bmJCK-00046f-KD NO DKIM FOUND!

2016-09-20 14:26:48 1bmJCK-00046f-KD DKIM test passed

2016-09-20 14:26:51 1bmJCK-00046f-KD <= a.bakhtin@innopolis.ru H=(smtp.university.innopolis.ru) [10.90.104.83] P=esmtps X=TLSv1.2:ECDHE-RSA-AES256-SHA384:256 CV=no S=2335 id=a4d3db9042d346a9a7fb3b4946caea8a@EXMB02.edu.innopolis.ru

2016-09-20 14:26:52 1bmJCK-00046f-KD => mail@st3.os3.su <horn@st2.os3.su> R=dnslookup T=remote\_smtp H=mail.st3.os3.su [188.130.155.36] C="250 2.0.0 Ok: queued as 70E2236C0528"

2016-09-20 14:26:52 1bmJCK-00046f-KD Completed

2016-09-20 14:26:56 1bmJCS-00047B-1J DKIM: d=innopolis.ru s=unimail1 c=simple/simple a=rsa-sha256 b=2048 t=1474370807 [verification succeeded]

2016-09-20 14:26:56 1bmJCS-00047B-1J NO DKIM FOUND!

2016-09-20 14:26:56 1bmJCS-00047B-1J DKIM test passed

2016-09-20 14:26:58 1bmJCS-00047B-1J <= a.bakhtin@innopolis.ru H=mail.st5.os3.su (st5.os3.su) [188.130.155.38] P=esmtps X=TLSv1.2:ECDHE-RSA-AES256-GCM-SHA384:256 CV=no S=3148 id=a4d3db9042d346a9a7fb3b4946caea8a@EXMB02.edu.innopolis.ru

2016-09-20 14:26:59 1bmJCS-00047B-1J => mail@st3.os3.su <horn@st2.os3.su> R=dnslookup T=remote\_smtp H=mail.st3.os3.su [188.130.155.36] C="250 2.0.0 Ok: queued as 7473936C0528"

2016-09-20 14:26:59 1bmJCS-00047B-1J Completed

2016-09-20 14:27:02 1bmJCX-00047i-WB DKIM: d=innopolis.ru s=unimail1 c=simple/simple a=rsa-sha256 b=2048 t=1474370807 [verification succeeded]

2016-09-20 14:27:02 1bmJCX-00047i-WB NO DKIM FOUND!

2016-09-20 14:27:02 1bmJCX-00047i-WB DKIM test passed

2016-09-20 14:27:04 1bmJCX-00047i-WB <= a.bakhtin@innopolis.ru H=mail.st5.os3.su (st5.os3.su) [188.130.155.38] P=esmtps X=TLSv1.2:ECDHE-RSA-AES256-GCM-SHA384:256 CV=no S=3961 id=a4d3db9042d346a9a7fb3b4946caea8a@EXMB02.edu.innopolis.ru

2016-09-20 14:27:05 1bmJCX-00047i-WB => mail@st3.os3.su <horn@st2.os3.su> R=dnslookup T=remote\_smtp H=mail.st3.os3.su [188.130.155.36] C="250 2.0.0 Ok: queued as 2FF9F36C0528"

2016-09-20 14:27:05 1bmJCX-00047i-WB Completed

2016-09-20 14:27:08 1bmJCe-00048D-3c DKIM: d=innopolis.ru s=unimail1 c=simple/simple a=rsa-sha256 b=2048 t=1474370807 [verification succeeded]

2016-09-20 14:27:08 1bmJCe-00048D-3c NO DKIM FOUND!

2016-09-20 14:27:08 1bmJCe-00048D-3c DKIM test passed

2016-09-20 14:27:10 1bmJCe-00048D-3c <= a.bakhtin@innopolis.ru H=mail.st5.os3.su (st5.os3.su) [188.130.155.38] P=esmtps X=TLSv1.2:ECDHE-RSA-AES256-GCM-SHA384:256 CV=no S=4774 id=a4d3db9042d346a9a7fb3b4946caea8a@EXMB02.edu.innopolis.ru

2016-09-20 14:27:11 1bmJCe-00048D-3c => mail@st3.os3.su <horn@st2.os3.su> R=dnslookup T=remote\_smtp H=mail.st3.os3.su [188.130.155.36] C="250 2.0.0 Ok: queued as 3D15036C0528"

2016-09-20 14:27:11 1bmJCe-00048D-3c Completed

2016-09-20 14:27:13 1bmJCj-00048j-FW DKIM: d=innopolis.ru s=unimail1 c=simple/simple a=rsa-sha256 b=2048 t=1474370807 [verification succeeded]

2016-09-20 14:27:13 1bmJCj-00048j-FW NO DKIM FOUND!

2016-09-20 14:27:13 1bmJCj-00048j-FW DKIM test passed

2016-09-20 14:27:16 1bmJCj-00048j-FW <= a.bakhtin@innopolis.ru H=mail.st5.os3.su (st5.os3.su) [188.130.155.38] P=esmtps X=TLSv1.2:ECDHE-RSA-AES256-GCM-SHA384:256 CV=no S=5587 id=a4d3db9042d346a9a7fb3b4946caea8a@EXMB02.edu.innopolis.ru

2016-09-20 14:27:16 1bmJCj-00048j-FW => mail@st3.os3.su <horn@st2.os3.su> R=dnslookup T=remote\_smtp H=mail.st3.os3.su [188.130.155.36] C="250 2.0.0 Ok: queued as A06C636C0528"

2016-09-20 14:27:16 1bmJCj-00048j-FW Completed

2016-09-20 14:27:19 1bmJCp-000497-DF DKIM: d=innopolis.ru s=unimail1 c=simple/simple a=rsa-sha256 b=2048 t=1474370807 [verification succeeded]

2016-09-20 14:27:19 1bmJCp-000497-DF NO DKIM FOUND!

2016-09-20 14:27:19 1bmJCp-000497-DF DKIM test passed

2016-09-20 14:27:22 1bmJCp-000497-DF <= a.bakhtin@innopolis.ru H=mail.st5.os3.su (st5.os3.su) [188.130.155.38] P=esmtps X=TLSv1.2:ECDHE-RSA-AES256-GCM-SHA384:256 CV=no S=6400 id=a4d3db9042d346a9a7fb3b4946caea8a@EXMB02.edu.innopolis.ru

2016-09-20 14:27:22 1bmJCp-000497-DF => mail@st3.os3.su <horn@st2.os3.su> R=dnslookup T=remote\_smtp H=mail.st3.os3.su [188.130.155.36] C="250 2.0.0 Ok: queued as 83E8E36C0528"

2016-09-20 14:27:22 1bmJCp-000497-DF Completed

2016-09-20 14:27:24 1bmJCu-00049c-KE DKIM: d=innopolis.ru s=unimail1 c=simple/simple a=rsa-sha256 b=2048 t=1474370807 [verification succeeded]

2016-09-20 14:27:24 1bmJCu-00049c-KE NO DKIM FOUND!

2016-09-20 14:27:24 1bmJCu-00049c-KE DKIM test passed

2016-09-20 14:27:27 1bmJCu-00049c-KE <= a.bakhtin@innopolis.ru H=mail.st5.os3.su (st5.os3.su) [188.130.155.38] P=esmtps X=TLSv1.2:ECDHE-RSA-AES256-GCM-SHA384:256 CV=no S=7213 id=a4d3db9042d346a9a7fb3b4946caea8a@EXMB02.edu.innopolis.ru

2016-09-20 14:27:27 1bmJCu-00049c-KE => mail@st3.os3.su <horn@st2.os3.su> R=dnslookup T=remote\_smtp H=mail.st3.os3.su [188.130.155.36] C="250 2.0.0 Ok: queued as ADF8136C0528"

2016-09-20 14:27:27 1bmJCu-00049c-KE Completed

2016-09-20 14:27:29 1bmJCz-0004A8-NV DKIM: d=innopolis.ru s=unimail1 c=simple/simple a=rsa-sha256 b=2048 t=1474370807 [verification succeeded]

2016-09-20 14:27:29 1bmJCz-0004A8-NV NO DKIM FOUND!

2016-09-20 14:27:29 1bmJCz-0004A8-NV DKIM test passed

2016-09-20 14:27:32 1bmJCz-0004A8-NV <= a.bakhtin@innopolis.ru H=mail.st5.os3.su (st5.os3.su) [188.130.155.38] P=esmtps X=TLSv1.2:ECDHE-RSA-AES256-GCM-SHA384:256 CV=no S=8026

id=a4d3db9042d346a9a7fb3b4946caea8a@EXMB02.edu.innopolis.ru

2016-09-20 14:27:32 1bmJCz-0004A8-NV => mail@st3.os3.su <horn@st2.os3.su> R=dnslookup T=remote\_smtp H=mail.st3.os3.su [188.130.155.36] C="250 2.0.0 Ok: queued as BA02C36C0528"

2016-09-20 14:27:32 1bmJCz-0004A8-NV Completed

2016-09-20 14:27:34 1bmJD4-0004AU-SH DKIM: d=innopolis.ru s=unimail1 c=simple/simple a=rsa-sha256 b=2048 t=1474370807 [verification succeeded]

2016-09-20 14:27:34 1bmJD4-0004AU-SH NO DKIM FOUND!

2016-09-20 14:27:34 1bmJD4-0004AU-SH DKIM test passed

2016-09-20 14:27:40 1bmJD4-0004AU-SH <= a.bakhtin@innopolis.ru H=mail.st5.os3.su (st5.os3.su) [188.130.155.38] P=esmtps X=TLSv1.2:ECDHE-RSA-AES256-GCM-SHA384:256 CV=no S=8839 id=a4d3db9042d346a9a7fb3b4946caea8a@EXMB02.edu.innopolis.ru

2016-09-20 14:27:40 1bmJD4-0004AU-SH => mail@st3.os3.su <horn@st2.os3.su> R=dnslookup T=remote\_smtp H=mail.st3.os3.su [188.130.155.36] C="250 2.0.0 Ok: queued as A1EE836C0528"

2016-09-20 14:27:40 1bmJD4-0004AU-SH Completed

2016-09-20 14:27:42 1bmJDC-0004B9-Lx DKIM: d=innopolis.ru s=unimail1 c=simple/simple a=rsa-sha256 b=2048 t=1474370807 [verification succeeded]

2016-09-20 14:27:42 1bmJDC-0004B9-Lx NO DKIM FOUND!

2016-09-20 14:27:42 1bmJDC-0004B9-Lx DKIM test passed

2016-09-20 14:27:45 1bmJDC-0004B9-Lx <= a.bakhtin@innopolis.ru H=mail.st5.os3.su (st5.os3.su) [188.130.155.38] P=esmtps X=TLSv1.2:ECDHE-RSA-AES256-GCM-SHA384:256 CV=no S=9652 id=a4d3db9042d346a9a7fb3b4946caea8a@EXMB02.edu.innopolis.ru

2016-09-20 14:27:45 1bmJDC-0004B9-Lx => mail@st3.os3.su <horn@st2.os3.su> R=dnslookup T=remote\_smtp H=mail.st3.os3.su [188.130.155.36] C="250 2.0.0 Ok: queued as B180136C0528"

2016-09-20 14:27:45 1bmJDC-0004B9-Lx Completed

2016-09-20 14:27:47 1bmJDH-0004BW-Mm DKIM: d=innopolis.ru s=unimail1 c=simple/simple a=rsa-sha256 b=2048 t=1474370807 [verification succeeded]

2016-09-20 14:27:47 1bmJDH-0004BW-Mm NO DKIM FOUND!

2016-09-20 14:27:47 1bmJDH-0004BW-Mm DKIM test passed

2016-09-20 14:27:50 1bmJDH-0004BW-Mm <= a.bakhtin@innopolis.ru H=mail.st5.os3.su (st5.os3.su) [188.130.155.38] P=esmtps X=TLSv1.2:ECDHE-RSA-AES256-GCM-SHA384:256 CV=no S=10465 id=a4d3db9042d346a9a7fb3b4946caea8a@EXMB02.edu.innopolis.ru

2016-09-20 14:27:50 1bmJDH-0004BW-Mm \*\* horn@st2.os3.su: Too many "Received" headers - suspected mail loop

2016-09-20 14:27:50 1bmJDK-0004Br-B1 <= <> R=1bmJDH-0004BW-Mm U=exim P=local S=11623

2016-09-20 14:27:50 1bmJDH-0004BW-Mm Completed

2016-09-20 14:27:51 1bmJDK-0004Br-B1 => a.bakhtin@innopolis.ru R=dnslookup T=remote\_smtp H=smtplex.infobox.ru [109.120.160.243] C="250 ok: Message 20571722 accepted"

2016-09-20 14:27:51 1bmJDK-0004Br-B1 Completed