That is why Rabobank has IPv6

External facing IPv6

Friso Feenstra Network Specialist
Why IPv6

2014 investigation:

- Is IPv6 necessary for our corporate websites (www.rabobank.nl)
- Is IPv6 necessary for our internal network
Why IPv6

2014 investigation:

- Is IPv6 necessary for our corporate websites ([www.rabobank.nl](http://www.rabobank.nl))
- Is IPv6 necessary for our internal network

My expectation:

  NO !!!!
  No IPv6
Why IPv6

2014 investigation:
• Is IPv6 necessary for our corporate websites (www.rabobank.nl)
• Is IPv6 necessary for our internal network

My expectation:
NO !!!!
No IPv6

internal addressing:
private (17 million addresses)

external addressing:
Rabobank IP space
145.72.0.0/16 (65,000 addresses)

Internet for office
NAT44 to provider IP space

Migration costs
time and money

Migration Risk
Why IPv6

2014 investigation:
• Is IPv6 necessary for our corporate websites (www.rabobank.nl)
• Is IPv6 necessary for our internal network

My expectation:
NO !!!!
No IPv6

internal addressing:
private (17 million addresses)

external addressing:
Rabobank IP space
145.72.0.0/16 (65,000 addresses)

Internet for office
NAT44 to provider IP space

Migration costs
time and money

Still investigation for
Are there reasons for IPv6 for Rabobank?
Investigation: Why IPv6

- What happens with IP addresses for
  - Web sites
  - Third parties
  - Customers
- If we stay on IPv4 will we miss something
- Can we postpone migration for the coming years:
  - Other parties can get the experience
  - Bugs and error have been solved
  - We have more time
  - Best practices can be developed
Investigation: Why IPv6

- What happens with IP addresses for
  - Websites
  - Third parties
  - Customers
- If we stay on IPv4 will we miss something
- Can we postpone migration for the coming years:
  - Other parties can get the experience
  - Bugs and error have been solved
  - We have more time
  - Best practices can be developed

Currently no problem: Websites relevant for Rabobank banking will be reachable through IPv4 for the coming years
Investigation: Why IPv6

- What happens with IP addresses for
  - Web sites
  - Third parties
  - Customers
- If we stay on IPv4 will we miss something
- Can we postpone migration for the coming years:
  - Other parties can get the experience
  - Bugs and error have been solved
  - We have more time
  - Best practises can be developed

Currently no problem:
Websites relevant for Rabobank banking will be reachable through IPv4 for the coming years

But what about financial web sites in countries with little IPv4 space???
Investigation: Why IPv6

- What happens with IP addresses for
  - Web sites
  - Third parties
  - Customers
- If we stay on IPv4 will we miss something
- Can we postpone migration for the coming years:
  - Other parties can get the experience
  - Bugs and error have been solved
  - We have more time
  - Best practises can be developed

For the coming years no problem: Communication with NAT or proxy in DMZ
Investigation: Why IPv6

• What happens with IP adresses for
  • Web sites
  • Third parties
  • Customers
• If we stay on IPv4 will we miss something
• Can we postpone migration for the coming years:
  • Other parties can get the experience
  • Bugs and error have been solved
  • We have more time
  • Best practises can be developed
Investigation: Why IPv6

- What happens with IP addresses for
  - Web sites
  - Third parties
  - Customers
- If we stay on IPv4 will we miss something
- Can we postpone migration for the coming years:
  - Other parties can get the experience
  - Bugs and error have been solved
  - We have more time
  - Best practices can be developed

Customers connected through ISP’s (KPN, Vodafone, Ziggo, etc.)
Investigation: Why IPv6

- What happens with IP addresses for
  - Web sites
  - Third parties
  - Customers
- If we stay on IPv4 will we miss something
- Can we postpone migration for the coming years:
  - Other parties can get the experience
  - Bugs and error have been solved
  - We have more time
  - Best practices can be developed

Customers connected through ISP’s (KPN, Vodafone, Ziggo, etc.)

ISPs have IPv4 space for existing customers
Investigation: Why IPv6

- What happens with IP addresses for
  - Web sites
  - Third parties
  - Customers

- If we stay on IPv4 will we miss something

- Can we postpone migration for the coming years:
  - Other parties can get the experience
  - Bugs and error have been solved
  - We have more time
  - Best practices can be developed

Customers connected through ISP’s (KPN, Vodafone, Ziggo, etc.)

ISPs have IPv4 space for existing customers

New customers?
New networks?
Investigation: Why IPv6
New customers? New networks?

- New networks – new customers
  - G₃ / G₄
  - Wifi
  - New area’s
  - Mergers
- IPv₄ NAT is used as solution
  - Expensive solution
  - Not for all customers
  - Recovery after disruption
- Alternative: IPv₆ + IPv₄ NAT
  - Because all main content is available on IPv₆
Investigation: Why IPv6
New customers? New networks?

- New networks – new customers
  - G3 / G4
  - Wifi
  - New area’s
  - Mergers
- IPv4 NAT is used as solution
  - Expensive solution
  - Not for all customers
  - Recovery after disruption
- Alternative: IPv6 + IPv4 NAT
  - Because all main content is available on IPv6

So more and more customers will be behind NAT if we don’t act.
Investigation: Why IPv6

New customers? New networks?

- New networks – new customers
  - G3 / G4
  - Wifi
  - New area’s
  - Mergers
- IPv4 NAT is used as solution
  - Expensive solution
  - Not for all customers
  - Recovery after disruption
- Alternative: IPv6 + IPv4 NAT
  - Because all main content is available on IPv6

So more and more customers will be behind NAT if we don’t act. Is that a problem???
Investigation: Why IPv6
More customers behind IPv4 NAT. Problem??
Investigation: Why IPv6
More customers behind IPv4 NAT. Problem??

• Security Operations Centre
  “The majority of the SOC tooling for protection of customer traffic becomes unreliable or unusable”
  Reason: Tooling is often based on IP addresses, for instance blocking one IP address leads to blocking whole groups of customers
Investigation: Why IPv6
More customers behind IPv4 NAT. Problem??

- Security Operations Centre
  “The majority of the SOC tooling for protection of customer traffic becomes unreliable or unusable”
  *Reason*: Tooling is often based on IP addresses, for instance blocking one IP address leads to blocking whole groups of customers

- Transaction monitoring, withing FEC (Financial Economic Crime)
  “IP address is one of the more important pillars for detection of Phishing”
  “Many security components will lose effectiveness”
Investigation: Why IPv6
More customers behind IPv4 NAT. Problem??

- Security Operations Centre
  “The majority of the SOC tooling for protection of customer traffic becomes unreliable or unusable”
  Reason: Tooling is often based on IP addresses, for instance blocking one IP address leads to blocking whole groups of customers

- Transaction monitoring, within FEC (Financial Economic Crime)
  “IP address is one of the more important pillars for detection of Phishing”
  “Many security components will lose effectiveness”

- VCM (Virtual Channel Monitoring), within FEC
  “More than 15% customers traffic behind provider NAT is not acceptable”
Investigation: Why IPv6

- What happens with IP addresses for
  - Web sites
  - Third parties
  - Customers
- If we stay on IPv4 will we miss something
- Can we postpone migration for the coming years:
  - Other parties can get the experience
  - Bugs and error have been solved
  - We have more time
  - Best practices can be developed
Investigation: Why IPv6

• What happens with IP addresses for
  • Web sites
  • Third parties
  • Customers
• If we stay on IPv4 will we miss something
• Can we postpone migration for the coming years:
  • Other parties can get the experience
  • Bugs and error have been solved
  • We have more time
  • Best practices can be developed

But once there will be IPv6-only:
  • Features
  • Applications
  • Web sites
That we need!!!
Investigation: Why IPv6

• What happens with IP addresses for
  • Web sites
  • Third parties
  • Customers
• If we stay on IPv4 will we miss something
• Can we postpone migration for the coming years:
  • Other parties can get the experience
  • Bugs and error have been solved
  • We have more time
  • Best practises can be developed

But once there will be IPv6-only:
  • Features
  • Applications
  • Web sites
  That we need!!!

When is this going to happen
When will we know this
How much lead time do we have
Is this enough
Investigation: Why IPv6

- What happens with IP addresses for
  - Web sites
  - Third parties
  - Customers
- If we stay on IPv4 will we miss something
- Can we postpone migration for the coming years:
  - Other parties can get the experience
  - Bugs and error have been solved
  - We have more time
  - Best practices can be developed

But once there will be IPv6-only:
- Features
- Applications
  - Web sites
  That we need!!!

When is this going to happen
When will we know this
How much lead time do we have
Is this enough

Expectation: 2018 - 2025
Investigation: Why IPv6

- What happens with IP addresses for
  - Web sites
  - Third parties
  - Customers
- If we stay on IPv4 will we miss something
- Can we postpone migration for the coming years:
  - Other parties can get the experience
  - Bugs and error have been solved
  - We have more time
  - Best practises can be developed

But once there will be IPv6-only:
  - Features
  - Applications
  - Web sites
  - That we need!!!

When is this going to happen
When will we know this
Expectation: 2018 - 2025
How much lead time do we have
Is this enough

.5 – 1 year in advance
Investigation: Why IPv6

- What happens with IP addresses for
  - Web sites
  - Third parties
  - Customers
- If we stay on IPv4 will we miss something
- Can we postpone migration for the coming years:
  - Other parties can get the experience
  - Bugs and error have been solved
  - We have more time
  - Best practices can be developed

But once there will be IPv6-only:
- Features
- Applications
- Web sites
  That we need!!!

When is this going to happen
When will we know this
How much lead time do we have
Is this enough

Expectation: 2018 - 2025
.5 – 1 year in advance

NO!!!
Approach

- External facing IPv6 project
  - Started Q2-3 2015
  - IPv6 until external Load Balancer
- Multiple departments involved
  - Networking (tooling, training and technical aspects)
  - Security Operations Centre (monitoring, DDOS mitigation, IPDS, etc.)
  - VCM (rapporting, fraud prevention, anti-phising), etc.
- Project per department for department activities with governance project for communication and time lines
- Finished [www.rabobank.nl](http://www.rabobank.nl) ➔ 2a02:cc4:2000::10

- IPv6 internal project
  - Planned to start in 2017
  - Three levels (network, platform, applications)
  - Target network + platform ➔ dual stack; applications is possible IPv6
Topology for main external facing Rabobank web sites

Internet IPv4 IPv6

EK 4&6

DDOS IPDS 4&6

External Load Bal. 4&6

Content Inspection 4&6

Internal Load Bal. 4&6

Content Processing 4
Topology for main external facing Rabobank web sites

Internet
IPv4
IPv6

EK
4&6

DDOS
IPDS
4&6

External
Load Bal. 4&6

Content
Inspection 4&6

Internal
Load Bal. 4&6

Content
Processing 4

Two load balancers?

IPv4 & IPv6 session state!
Topology for main external facing Rabobank web sites

Internet peering

Internet IPv4 IPv6

EK 4&6

DDOS IPDS 4&6

External Load Bal. 4&6

Content Inspection 4&6

Internal Load Bal. 4&6

Content Processing 4

SSL offloading X-forward RFC 7239

IPv4 & IPv6 session state!

Two load balancers?
Topology for main external facing Rabobank web sites

Internet peering

Internet IPv4 IPv6

EK 4&6

DDOS IPDS 4&6

External Load Bal. 4&6

Content Inspection 4&6

Internal Load Bal. 4&6

Content Processing 4

IPv4 & IPv6 session state!

SSL offloading X-forward RFC 7239

Clear text

Two load balancers?
Topology for main external facing Rabobank web sites

- Internet peering
- Internet IPv4 IPv6
- EK 4&6
- DDOS IPDS 4&6
- External Load Bal. 4&6
- Content Inspection 4&6
- Internal Load Bal. 4&6
- Content Processing 4

- SSL offloading
- X-forward
- RFC 7239

- Clear text
- Triggers IPDS Defense
- IPv4 & IPv6 session state!

- Two load balancers?
Topology for main external facing Rabobank web sites

Internet IPv4 IPv6

Internet peering

EK 4&6

DDOS IPDS 4&6

SSL offloading X-forward RFC 7239

External Load Bal. 4&6

Content Inspection 4&6

Clear text

Internal Load Bal. 4&6

LTM IPv4 SNAT

Content Processing 4

IPv4 & IPv6 session state!

Two load balancers?
Q&A??