

# Deploying IPv6 for an African ISP



By:  
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# How did this all started?

- AfriNIC 15 meeting held in Yaoundé, Cameroon in November 2011
- Presentations of IPv6 deployments in Egypt, South Africa and Sudan during the African IPv6 initiatives session.



# Who is Jaguar Network?

- Jaguar Network is a French & Swiss network operator founded in 2001 in Marseille (France). Our main target is providing small & medium business xDSL connectivity, IP transit, point to point transport, IP/MPLS VPN, colocation & housing services in more than 30 facilities across Europe.
- Jaguar Network is building a powerful and resilient optical fiber network in Europe to provide high speed and redundant access for all the services provided. Developing it's own label known as "THD" (Très Haute Disponibilité), Jaguar Network focus on quality and proximity with its customers in order to bring valued services to our customers.



# Who is Creolink?

- CREOLINK is an enterprise that specialized in the provision of Telecommunications services.
- It offers and proposes optimal and innovative communications solutions for all audiences, including access to high-speed Internet, telephony, connection of multiple remote sites and much more...
- Established in January 2001, CREOLINK has revolutionized the management of daily business work in Cameroon with its perfect knowledge of the implementation of new technologies of information and communication.



# First step: get an IPv6 allocation

- Started the discussion during the IPv6 session of Tuesday November 22<sup>nd</sup>.
- Creolink was already a member of AfrinIC.
- Went to the registration desk to get some help in doing the request and, on Thursday November 24<sup>th</sup>...

# First step: get an IPv6 allocation

```
inet6num:    2c0f:fae0::/32
netname:     Creolink
descr:       Creolink Communications
country:     CM
admin-c:     JM2-AFRINIC
tech-c:      JM2-AFRINIC
org:         ORG-CC1-AFRINIC
status:      ALLOCATED-BY-RIR
mnt-by:      AFRINIC-HM-MNT
mnt-lower:   Creolink-MNT
notify:      support@creolink.com
notify:      serges_fonkou@creolink.com
changed:     hostmaster@afrrinic.net 20111124
source:      AFRINIC
parent:      2c00::/12
```

# Second step: doing the IP Plan

- What are the constraints Creolink faces on its current network design?
- What type of customers does Creolink have?
- What size of subnet do they want to give to each customer type?

# Second step: doing the IP Plan

- Allocation from Afrinic: 2c0f:fae0::/32
- Decision to divide the /32 into 16 x /36 for 16 possible “main cities”.
- Each /36 was subdivided into 16 x /40 for specific usage inside a city.



# Second step: doing the IP Plan

- Out of the 16 x /40 in each city, the following usage was reserved:
  - 1 x /40 for backbone and internal usage (equipment loopbacks, network interconnections, office IPs...)
  - 1 x /40 for collocation services.
  - ...

# Second step: doing the IP Plan

- Out of the 16 x /40 in each city, the following usage was reserved:
  - 1 x /40 for “Homelink” customer subnet. Each customer gets a /64 (16M+ customers).
  - 1 x /40 for “Officelink” customer subnet. Each customer gets a /56 (65536 customers).
  - 1 x /40 for “Corporatelink” customer subnet. Each customer gets a /48 (256 customers).

# Second step: doing the IP Plan

- Only 2 x /36 (for cities) used out of 16 possible globally.
- Only 5 x /40 (for “offers”) used out of 16 possible in each city.
- Flexible IP plan allowing growth and future deployment / changes in the infrastructure.

# Third step: Is the hardware ready?

- Are the Layer 3 routers for BGP and backbone IPv6 ready? (Hardware and Software).
- Are the Layer 3 distribution switches IPv6 ready?
- Is the packet shaper OK?
- What about the caching system?
- And the CPE at the customer sites?

# Third step: Is the hardware ready?

- Had to do some software update on Cisco routers.
- Found some hardware that was not at all compliant with IPv6.
- This part of the network will have to live without IPv6 until they buy new hardware.

# Fourth step: Now it's time to play!

- Creolink had Internet connectivity from Camtel (Cameroun National Telecom Operator) who was not IPv6 ready.
- Setup an IPv6 in IP GRE tunnel between Jaguar Network infrastructure and Creolink.

# Fourth step: Now it's time to play!

- Enabling IPv6 on the Creolink router:

```
ipv6 unicast-routing
```

```
ipv6 cef
```

- Securing access to the router:

```
ipv6 access-list SSH
```

```
deny ipv6 any any log
```

```
!
```

```
line vty 0 15
```

```
ipv6 access-class SSH in
```

# Fourth step: Now it's time to play!

- Setting up a tunnel:

```
interface Tunnel123
```

```
no ip address
```

```
ipv6 address <Local IPv6 for the interconnection>/126
```

```
tunnel source Lo0
```

```
tunnel destination <IPv4 Loopback of the router on the other end>
```

```
tunnel mode ipv6ip
```



# Fourth step: Now it's time to play!

- December 1<sup>st</sup>: Yaoundé, we have a ping:

```
YDE-POP1-IBR-RT01#ping ipv6 2a01:240:1700:1::1
```

```
Type escape sequence to abort.
```

```
Sending 5, 100-byte ICMP Echos to 2A01:240:1700:1::1, timeout is 2 seconds:
```

```
Packet sent with a source address of 2A01:240:1700:1::2
```

```
!!!!
```

```
Success rate is 100 percent (5/5), round-trip min/avg/max = 132/132/132 ms
```





# Fourth step: Now it's time to play!

- Had to create route6 object for BGP filtering on the RIPE database:

```
route6:      2c0f:fae0::/32
descr:       Creolink LIR V6 Range
origin:      AS36905
mnt-by:      Creolink-MNT
changed:     joseph_mbock@creolink.com 20111202
source:      RIPE
```

# Fourth step: Now it's time to play!

- December 5<sup>th</sup> 2012: Creolink is the first ISP advertising an IPv6 subnet in Cameroun!

LG	Prefix	tld	NetName	Owner	AS	S	Allocated	First seen	Seen by	Last seen (*)
LG	2001:4268::/32		CAMNET-V6	CAMNET	15964	A	2006-06-13		0%	never
LG	2001:43f8:d0::/48		AFRINIC-MEETINGS		37278	A	2011-10-24	2011-11-18 22:33:17	100%	2012-05-10 15:18:08
LG	2c0f:fad8::/32		IAL_V6_PUBLIC1	INTERSAT AFRICA LTD		A	2011-11-23		0%	never
LG	2c0f:fae0::/32		Creolink	Creolink Communications	36905	A	2011-11-24	2011-12-05 09:18:22	99%	2012-05-10 15:18:21

Source: <http://www.sixxs.net/tools/grh/dfp/all/?country=cm>

# Fourth step: Now it's time to play!

- From 0 to advertising the subnet in BGP on the internet and being able to see the Kame.net turtle dance on your screen in 2 weeks!



- That was the easy part: Now the longer and harder work start here...

# What's next?

- Lots of work to be done before actually providing IPv6 to the customers:
  - Have the provisioning system IPv6 ready so there is no manual action while installing new customers.
  - Have the server provide the services in dual stack (DNS, Web, mail, FTP...)

# My offer to the Afrinic Community

- If your upstream provider(s) isn't able to give you IPv6 connectivity.
- If you are a member of Afrinic who already has his allocation or wants one.
- If after all those talk during Afrinic16, you understood that IPv6 is not an option for your future, but a must have for the development of your company.

# My offer to the Afrinic Community

Jaguar Network is offering for absolutely no cost to do the exact same thing we did with Creolink with your network:

- Help you with all the aspects of the database update.
- Help you assess which devices are IPv6 ready or not inside your network.
- Give you a free IPv6 in IP tunnel with a BGP feed until your upstream provider can give you native IPv6 connectivity.

You have no more excuses not to start your IPv6 project !

Why don't you go to Afrinic registration after this presentation to get your allocation and start your IPv6 deployment?

Any Questions?