Palestine Internet Exchange Point (PIX)

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What is an Internet Exchange Point

- An **Internet exchange point** (**IX** or **IXP**) is a physical infrastructure through which Internet Service Providers (ISPs) exchange traffic between their networks (autonomous systems).
- IXPs reduce the portion of an ISP's traffic which must be delivered via their upstream transit providers, thereby reducing the average per-bit delivery cost of their service.

Definitions and Interpretation

- ISOC-PS: the Internet Society, Palestine chapter .
- MOTIT: Palestinian Ministry of Telecom and IT.
- Peers : An organization that is licensed to be an IP service provider (by the Ministry of Telecom and IT), or a Palestinian university, can become an PIX Peer. It can then connect to the PIX and receive the routing services provided by the PIX.
- PIX: Palestine Internet Exchange, a service to provide routing services for local traffic between licensed Palestinian Internet providers.

Definitions and Interpretation

- Fees: are the charges levied from Peers by the ISOC-PS for the services rendered through the PIX.
- Joining procedure: refers to the procedure for joining PIX as determined from time to time by the Board and approved.
- Maintainers: technical staff overseeing the PIX,or otherwise any person hired/contracted or volunteered to work as the technical manager /system administrator of the PIX main routers /switches.

PIX Project

- PIX is a national non for profit project aiming to make available local and international content to Palestinian internet users at lowest cost possible.

- PIX operational concept is based on the following points :

PIX Project

1. The Palestinian Internet eXchange is the central meeting point of the Internet Service Providers in Palestine. Its purpose is to route all intra-Palestine Internet traffic, among the operators, as efficiently as possible.

1. PIX is managed by the Palestine Internet Society (ISOC-PS), and is operated by delegates thereof. ISOC-PS makes all efforts to operate the PIX in a professional manner and to provide an excellent service to its Peers.

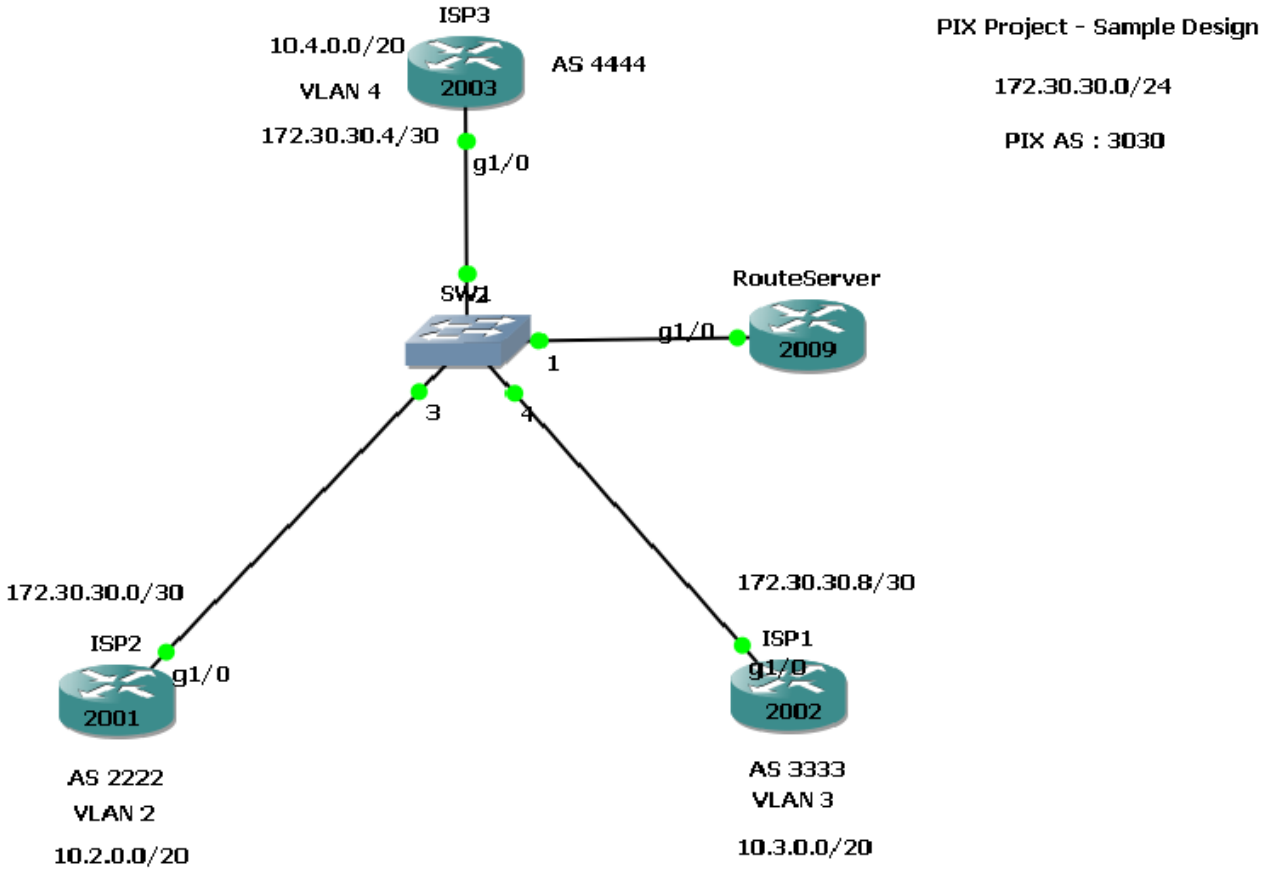
PIX Project

3. ISOC-PS, and hence the PIX operation, is a not-for-profit operation .
4. ISOC-PS shall endeavor to create and maintain a stable and robust system capable of handling the operation of the PIX.
5. The PIX project should be a self sustaining project capable of generating enough revenue to support its current and future needs. Revenues should be based on Peering Fees, collocation Fees and others and see fit by the ISOC-PS community in General.

PIX Project

6. ISOC-PS shall be act neutrally in regards to the operation of the PIX and to the best interest of the internet community in Palestine.
7. The PIX Scope of work includes but not limited to Acting as a meeting point for Palestinian service providers. Other functions of the PIX can be defined and implemented as the need for them arise.

Conceptual Diagram of an IXP



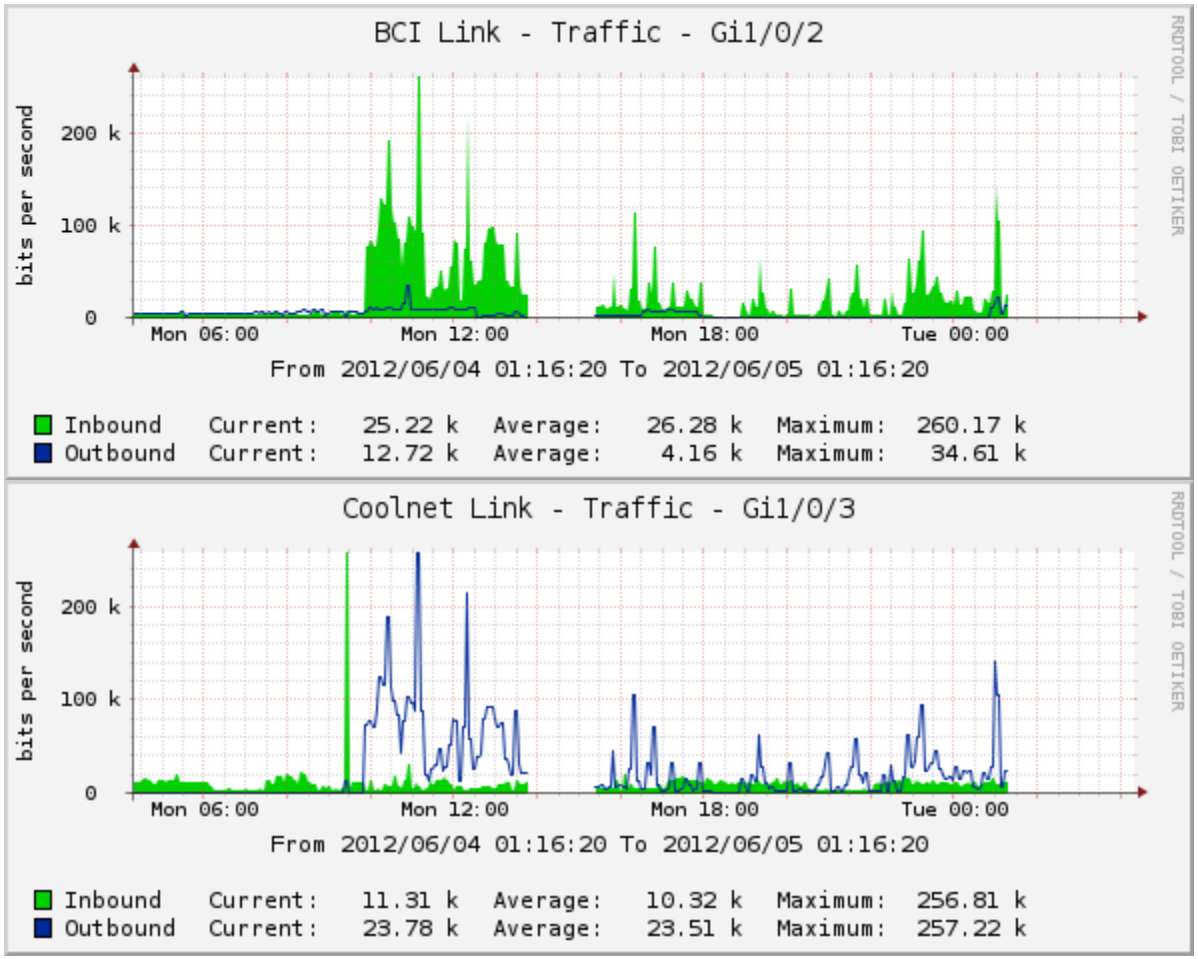
Why did we start PIX Project

- Before PIX, customer of one ISP used to get to customer of the other ISP via international connections .
- International Bandwidth used to costs significantly more than domestic bandwidth.
- Depending only on international connections for local traffic wastes money and harms performance .
- Significant increase in the local content inside Palestine .

Pilot Project

- ISOC chose Neutral place to Host PIX .
- 4th of June 2012 is the date to remember; Palestine Internet Exchange Point is Alive ...!
- We started with two Palestinian internet service providers peer with each other

First Packets via PIX



Traceroute Changed

- Tracing route to 188.225.225.1 over a maximum of 30 hops (VIA PIX)

- 1 1 ms 1 ms 2 ms 10.10.10.3
- 2 43 ms 47 ms 41 ms 93.184.3.113
- 3 55 ms 51 ms 48 ms 93.184.0.37
- 4 45 ms 49 ms 48 ms 192.168.250.5
- 5 74 ms 63 ms 73 ms 192.168.250.10
- 6 63 ms 62 ms 53 ms 188.225.225.1

- Tracing route to 188.225.225.1 over a maximum of 30 hops (VIA INTERNATIONAL LINKS)

- 1 1 ms 1 ms 1 ms 10.10.10.3
- 2 52 ms 45 ms 55 ms 93.184.3.113
- 3 55 ms 64 ms 52 ms 46.18.17.37
- 4 58 ms 58 ms 36 ms 10.11.12.1
- 5 * * * Request timed out.
- 6 103 ms 113 ms 114 ms 62.219.189.130
- 7 107 ms 108 ms 108 ms 63.218.15.137
- 8 107 ms 109 ms 114 ms 77.67.94.149
- 9 113 ms 94 ms 111 ms 89.149.183.77
- 10 154 ms 163 ms 147 ms 77.67.76.182
- 11 148 ms 168 ms 160 ms 188.225.225.1

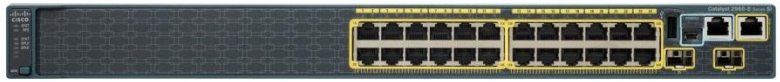
After less than 1 week

- A third forth and fifth ISPs entered the equation.
- All Peering ISPs agreed to join the PIX to :
- Keep Local Traffic local .
- Save Money.
- Improve network performance and QOS .
- Their customers enjoy this new Internet experience
- All this attracts businesses, customers, and content

PIX Design Consideration

- PIX Core is

CISCO 3900 ISR
Route Server



CISCO 2960 switch

Route Server

- ISP Routers peer with the Route Servers so it only need to have one eBGP sessios rather than N (with each ISP) .
- Advantages :

- Avoids having to maintain a large number of eBGP peers
- Separation of Routing and Forwarding
- Simplify Routing Configuration Management on ISPs routers

PIX Design Consideration

- Each ISP participating in the IXP prepares access to the PIX location; Fiber or MICROWAVE .
- Each ISP will be connected to a specific labeled Port on the PIX Switch. A Unique VLAN will be configured for each ISP to provide his Router with the connectivity to the PIX Router.
- Each ISP will be assigned /30 From a Private Pool to PROVIDE his Router with layer 3 Connectivity to PIX Router.

PIX Design Consideration

- Each BGP Session will be configured by router-id command from each ISP Router.
- BGP sessions will be protected by a password.
- Each ISP will only aggregate his Routes, default route to the Route Server is forbidden, The Route Server will be configured with a filter list to receive only ISPs subnets.
- Local-preference will be set to greater than 100, in order to prefer local content through PIX.

PIX Design Consideration

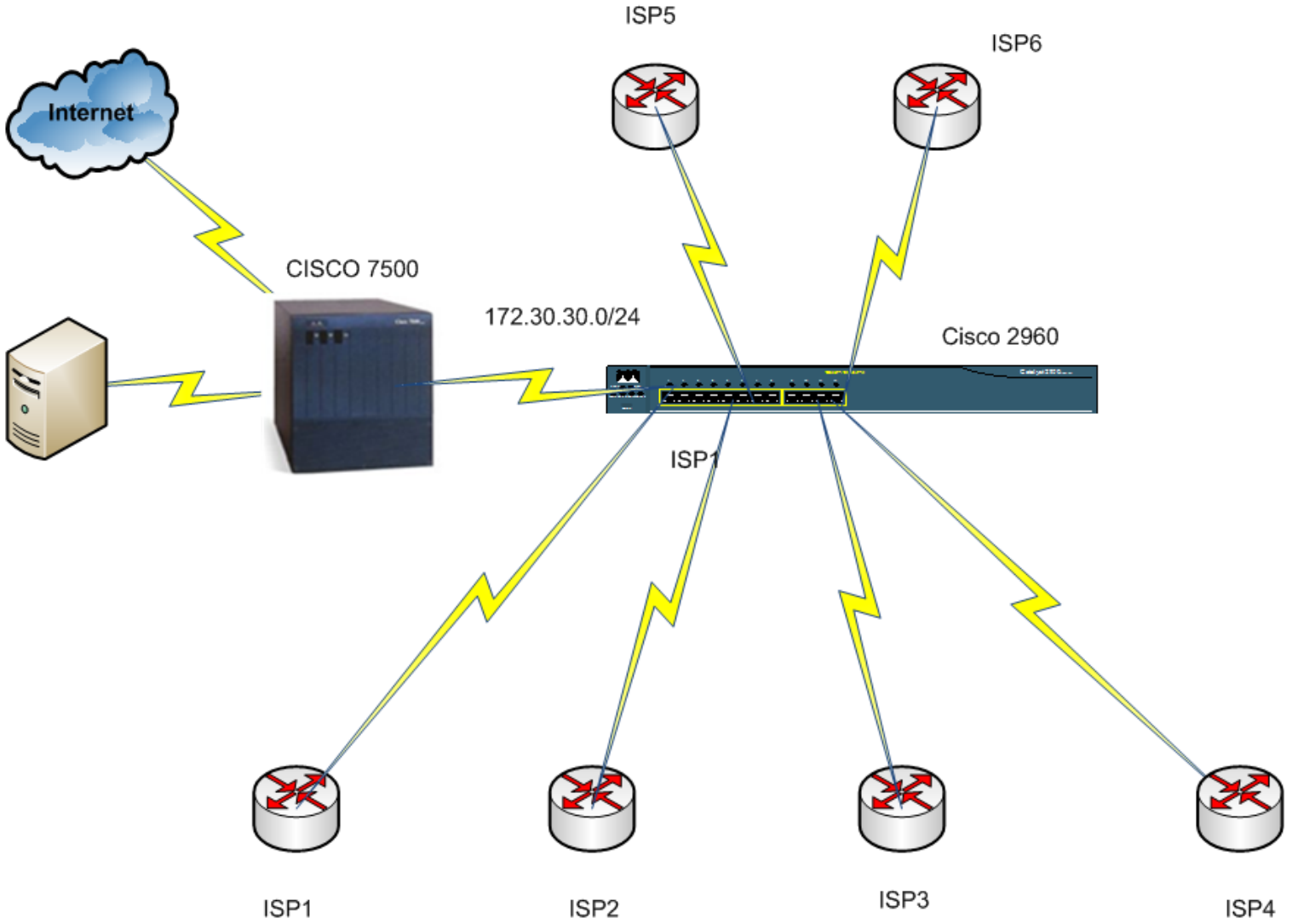
- The Router will be configured under high level of cisco security standards.
- Access to Router will be configured using parser view commands.
- According To the Monitoring Server. FREEBSD Server will be configured with all monitoring tools using SNMP-V2 read only protocol (Cacti).

See APPENDIX for more information

Services to Offer in the future

- ccTLD DNS : PIX could host the country ' s top level DNS (.ps).
- Looking Glass : One way of making the Route Collector routes available for global view
- Content Redistribution/Caching

Palestine Internet Exchange Point



Internet Exchange Point Arab Locations

- According to Packet Clearing House Report on Internet Exchange Point Locations :
- There are 6 Arab Countries with IXPs :
  - Egypt
  - Lebanon
  - UAE
  - Bahrain
  - Lebanon
  - Saudi Arabia

APPENDIX

- A.1- PIX Route Server Configuration

Interfaces configuration part

```
R(config)#interface GigabitEthernet1/0.2
R(config-subif)#description Connection-TO-ISP2
R(config-subif)# encapsulation dot1Q 2
R(config-subif)# ip address 172.30.30.1 255.255.255.252
R(config-subif)# no ip redirects
R(config-subif)# no ip proxy-arp
```

APPENDIX

```
R(config)# interface GigabitEthernet1/0.3
R(config-subif)# description Connection-TO-ISP3
R(config-subif)# encapsulation dot1Q 3
R(config-subif)# ip address 172.30.30.9 255.255.255.252
R(config-subif)# no ip redirects
R(config-subif)# no ip proxy-arp
R(config-subif)# ip ospf 1 area 0
```

APPENDIX

BGP Configuration part

```
R(config)# router bgp 3030
R(config-router)#bgp log-neighbor-changes
R(config-router)# neighbor 172.30.30.2 remote-as 2222
R(config-router)# neighbor 172.30.30.2 description BGP-PEER     WITH-ISP2
R(config-router)# neighbor 172.30.30.2 password 7  14141B180F0B
R(config-router)# neighbor 172.30.30.10 remote-as 3333
```

APPENDIX

```
R(config)#neighbor 172.30.30.10 description BGP-PEER-WITH-ISP3
R(config-router)# neighbor 172.30.30.10 password 7 00071A150754
R(config-router)# redistribute connected
R(config-router)# address-family ipv4
(config-router-af)# no synchronization
(config-router-af)# neighbor 172.30.30.2 activate
(config-router-af)# neighbor 172.30.30.2 prefix-list ISP2-PREFIX in
```

APPENDIX

```
(config-router-af)# neighbor 172.30.30.10 activate
(config-router-af)# neighbor 172.30.30.10 prefix-list ISP3-PREFIX in
(config-router-af)# no auto-summary
(config-router-af)# exit-address-family

(config)# ip prefix-list ISP2-PREFIX seq 10 permit 10.2.0.0/20
(config)# ip prefix-list ISP3-PREFIX seq 10 permit 10.3.0.0/20
```

APPENDIX

- A.2 – ISP “X” Router Configuration Example:

Interfaces configuration part

```
R(config-router)# interface GigabitEthernet1/0.3
(config-router-af)# description Connection-with-PIX-Switch
(config-router-af)# encapsulation dot1Q 3
(config-router-af)# ip address 172.30.30.10 255.255.255.252
```

APPENDIX

- **BGP Configuration part**

R(config)# router bgp 3333
R(config-router)# bgp router-id 3.3.3.3
R(config-router)# bgp log-neighbor-changes
R(config-router)# neighbor 172.30.30.9 remote-as 3030
R(config-router)# neighbor 172.30.30.9 description BGP-PEER-WITH-PIX-Router
R(config-router)# neighbor 172.30.30.9 password cisco

APPENDIX

```
R(config-router)# address-family ipv4
R(config-router-af)# no synchronization
R(config-router-af)# network 10.3.0.0 mask 255.255.240.0
R(config-router-af)# network 12.3.0.0 mask 255.255.240.0
R(config-router-af)# neighbor 172.30.30.9 activate
R(config-router-af)# neighbor 172.30.30.9 prefix-list pix-route-
server in
R(config-router-af)# neighbor 172.30.30.9 prefix-list ISP3-PREFIX out
```

APPENDIX

R(config-router-af)# neighbor 172.30.30.9 route-map set-local-pref in

R(config-router-af)# no auto-summary

R(config-router-af)# exit-address-family

R(config)# ip route 10.3.0.0 255.255.240.0 Null0

R(config)# ip route 12.3.0.0 255.255.240.0 Null0

R(config)# ip prefix-list ISP3-PREFIX seq 5 permit 10.3.0.0/20

R(config)# ip prefix-list pix-route-server seq 5 permit 0.0.0.0/0 le 32

R(config)# route-map set-local-pref permit 10

R (config-route-map)#set local-preference 150

Thank you

Any Questions