Active Measurement on the Defense Research and Engineering Network (DREN)

GMI-AIMS-5 Workshop
10 Feb 2025

Phil Dykstra
phil.Dykstra.ctr@dren.hpc.mil


DREN Ark Locations
+ Hawaii & San Diego
Vancouver
Winnipeg
Seattle
WASHINGTON
MONTANA
NORTH DAKOTA
MINNESOTA
OREGON
IDAHO
SOUTH DAKOTA
WISCONSIN
MICHIGAN
WYOMING
NEBRASKA
IOWA
NEVADA
ILLINOIS
OHIO
San Francisco
United States
UTAH
COLORADO
INDIANA
WEST VIRGINIA
CALIFORNIA
KANSAS
MISSOURI
VIRGINIA
KENTUCKY
Las Vegas
NORTH CAROLINA
TENNESSEE
Los Angeles
OKLAHOMA
SOUTH CAROLINA
ARIZONA
ARKANSAS
San Diego
MISSISSIPPI
NEW MEXICO
ALABAMA
GEORGIA
Dallas
TEXAS
LOUISIANA
Houston
San Antonio
FLORIDA
Miami
Montreal
Ottawa
MAINE
VT
NH
Toronto
NEW YORK
MA
Boston
CT
RI
New York
PENN
Chicago
Washington
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image Landsat / Copernicus
Data LDEO-Columbia, NSF, NOAA
Google Earth
Imagery Date: 1/1/2021 38°57'27.32" N 97°51'37.39" W elev 1472 ft eye alt 2317.87 mi

Security Gateways to ‘H Root’ DNS

```
pdykstra@fireball:~$ ./dpx-ping.py h.root-servers.net
5a0-us.dpx  15.78 ms
dnj-us.dpx  26.94 ms
plv-us.dpx  15.24 ms
pym-us.dpx   0.66 ms     [instance at APG, MD]
rto-us.dpx   5.46 ms
san-us.dpx   2.20 ms     [instance at SanDiego, CA]
scm-us.dpx  13.67 ms
wj1-us.dpx  51.65 ms
```

Milliseconds to Anycast DNS services

SG	Location	Google 8.8.8.8	Cloudflare 1.1.1.1	HE 74.82.42.42	Level3 209.244.0.4	Quad9 9.9.9.9
5A0	Atlanta, GA	**25.29**	0.78	16.53	1.25	**0.60**
DNJ	Denver, CO	**37.84**	**26.21**	33.44	27.36	33.58
PLV	New Palestine, IN	**19.90**	**8.32**	13.92	9.47	14.07
PYM	Aberdeen, MD	2.85	2.83	**2.49**	**3.34**	2.89
RTO	Rialto, CA	**68.66**	2.11	**1.60**	1.88	66.91
SAN	San Diego, CA	**73.83**	7.33	**6.92**	7.43	72.85
SCM	Sacramento, CA	**64.73**	11.04	**10.88**	11.00	63.70
WJ1	Waipahu, HI	**114.08**	0.62	**0.57**	55.32	112.20

Milliseconds to Anycast DNS services

SG	Location	Google 8.8.8.8	Cloudflare 1.1.1.1	HE 74.82.42.42	Level3 209.244.0.4	Quad9 9.9.9.9
5A0	Atlanta, GA	25.29	0.78	16.53	1.25	0.60
DNJ	Denver, CO	37.84	26.21	33.44	27.36	33.58
PLV	New Palestine, IN	19.90	8.32	13.92	9.47	14.07
PYM	Aberdeen, MD	2.85	2.83	2.49	3.34	2.89
RTO	Rialto, CA	68.66	2.11	1.60	1.88	66.91
SAN	San Diego, CA	73.83	7.33	6.92	7.43	72.85
SCM	Sacramento, CA	64.73	11.04	10.88	11.00	63.70
WJ1	Waipahu, HI	114.08	0.62	0.57	55.32	112.20

Milliseconds to Anycast DNS services

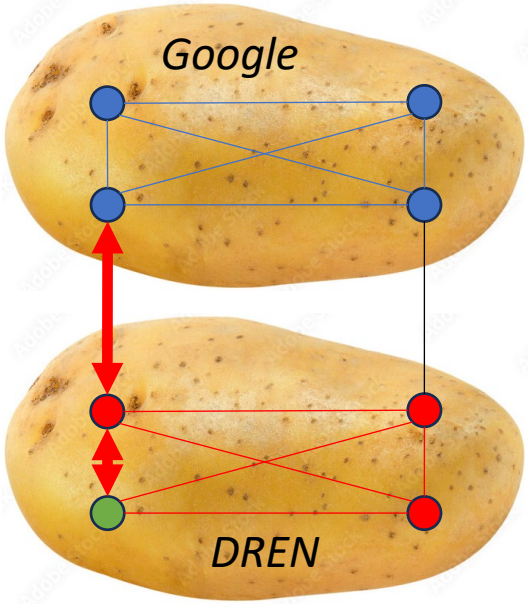
	SG	Location	Google 8.8.8.8	Cloudflare 1.1.1.1	HE 74.82.42.42	Level3 209.244.0.4	Quad9 9.9.9.9
#2	5A0	Atlanta, GA	25.29	0.78	16.53	1.25	0.60
	DNJ	Denver, CO	37.84	26.21	33.44	27.36	33.58
	PLV	New Palestine, IN	19.90	8.32	13.92	9.47	14.07
#1	PYM	Aberdeen, MD	2.85	2.83	2.49	3.34	2.89
#3	RTO	Rialto, CA	68.66	2.11	1.60	1.88	66.91
	SAN	San Diego, CA	73.83	7.33	6.92	7.43	72.85
	SCM	Sacramento, CA	64.73	11.04	10.88	11.00	63.70
	WJ1	Waipahu, HI	114.08	0.62	0.57	55.32	112.20

Milliseconds to Anycast DNS services

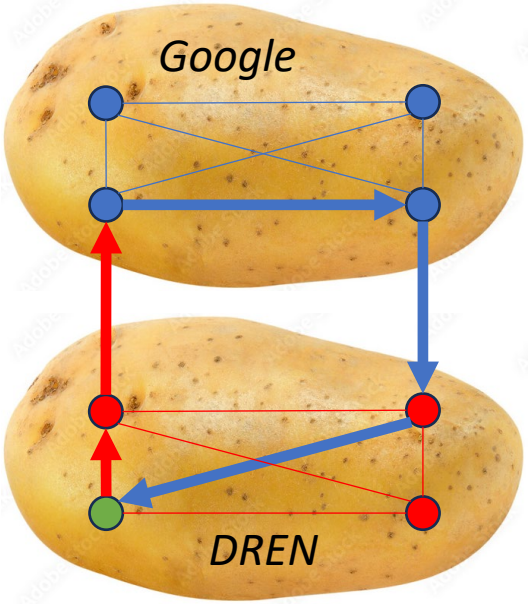
SG	Location	Google 8.8.8.8	Cloudflare 1.1.1.1	HE 74.82.42.42	Level3 209.244.0.4	Quad9 9.9.9.9
5A0	Atlanta, GA	25.29	0.78	16.53	1.25	0.60
DNJ	Denver, CO	37.84	26.21	33.44	27.36	33.58
PLV	New Palestine, IN	19.90	8.32	13.92	9.47	14.07
PYM	Aberdeen, MD	2.85	2.83	2.49	3.34	2.89
RTO	Rialto, CA	68.66	2.11	1.60	1.88	66.91
SAN	San Diego, CA	73.83	7.33	6.92	7.43	72.85
SCM	Sacramento, CA	64.73	11.04	10.88	11.00	63.70
WJ1	Waipahu, HI	114.08	0.62	0.57	55.32	112.20

Anycast to Google

- How it should work



- How it might be working
  - if Google thinks the green node is on the east coast



Where do they think DREN PX is?

MAXMIND Products Resources Company Sign In

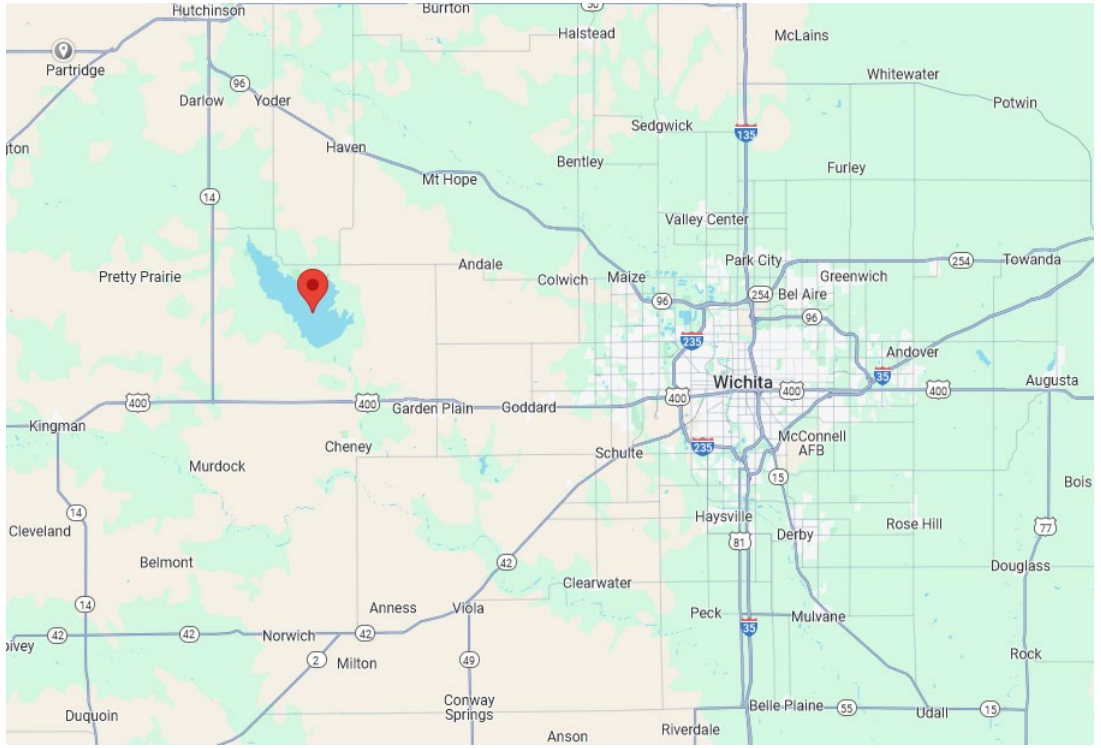
GeoIP web services demo | GeoIP databases demo | Locate my IP address

Enter up to 25 IP addresses separated by spaces or commas

143.56.1.250

View results

IP Address	Location	Network	Postal Code	Approximate Latitude / Longitude*, and Accuracy Radius	ISP / Organization	Domain	Connectio Type
143.56.1.250	United States (US), North America	143.56.0.0/17	-	37.751, -97.822 (1000 km)	US Department of Defense	-	Cable/DSL

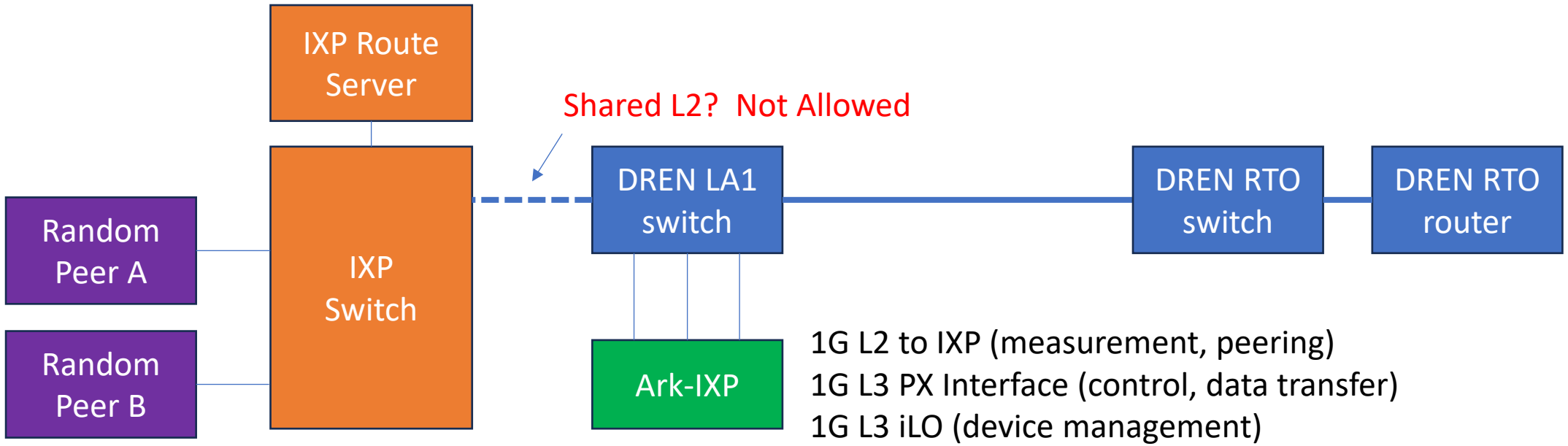


Scamper trace from DREN Hawaii to Korea

trace from wj1-us.dpx to 112.106.53.191 KR

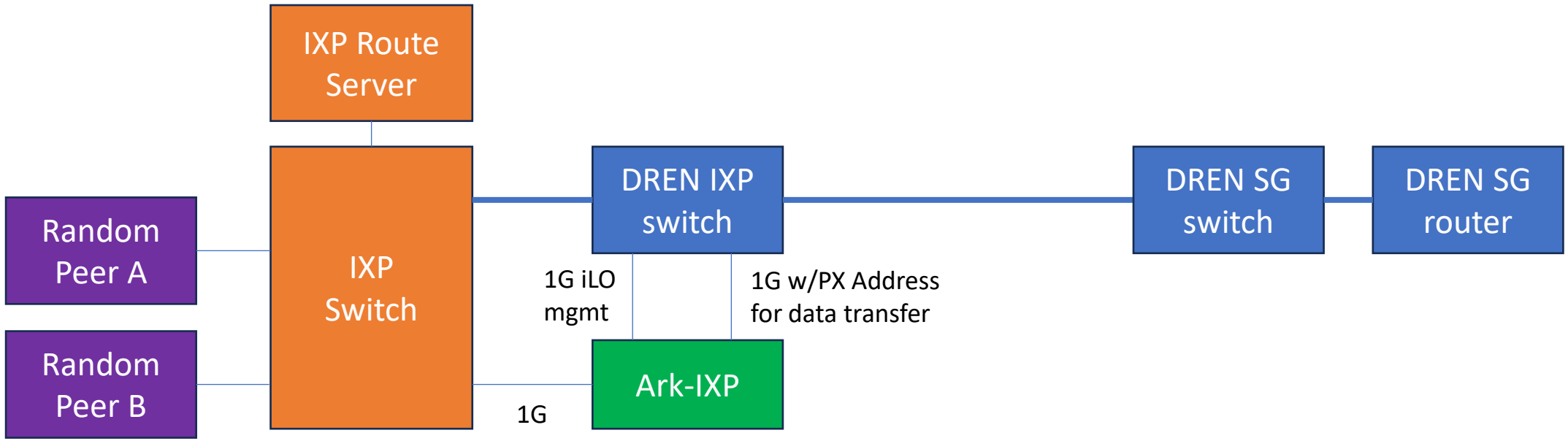
```
1  64.62.148.101     1.1          US            port-channel4.switch2.hnl1.he.net US-2ms
2  64.62.148.101     0.9          US            port-channel4.switch2.hnl1.he.net US-2ms
3  184.104.197.110  47.1          US              port-channel4.core3.lax2.he.net US-1ms
4  64.62.148.105    48.0          US                    e0-1.switch4.lax1.he.net US-3ms
5  207.45.208.18    47.1    cisco US   ix-be-40.ecore1.eql-losangeles.as6453.net US-1ms
6  206.82.129.42   202.2          US if-ae-55-2.tcore1.eql-losangeles.as6453.net US-1ms
7  64.86.252.65    200.2          US if-ae-6-20.tcore2.lvw-losangeles.as6453.net US-2ms
8  64.86.252.109   155.5  huawei  JP      if-et-53-8.hcore2.kv8-chiba.as6453.net JP-3ms
9  120.29.211.2    155.8          JP       if-et-1-2.hcore1.kv8-chiba.as6453.net JP-2ms
10 116.0.67.33      202.3 juniper HK   if-ae-16-2.tcore1.hk2-hongkong.as6453.net HK-2ms
11 180.87.112.31    197.0 juniper                                                HK-2ms
12 157.197.66.45    233.5 juniper                    u45.ppp66.samsung.co.kr KR-3ms
13 157.197.80.189   233.4 juniper                   u189.ppp80.samsung.co.kr KR-3ms
14 *
15 *
```

Ark-IXP at DREN Exchange Points?

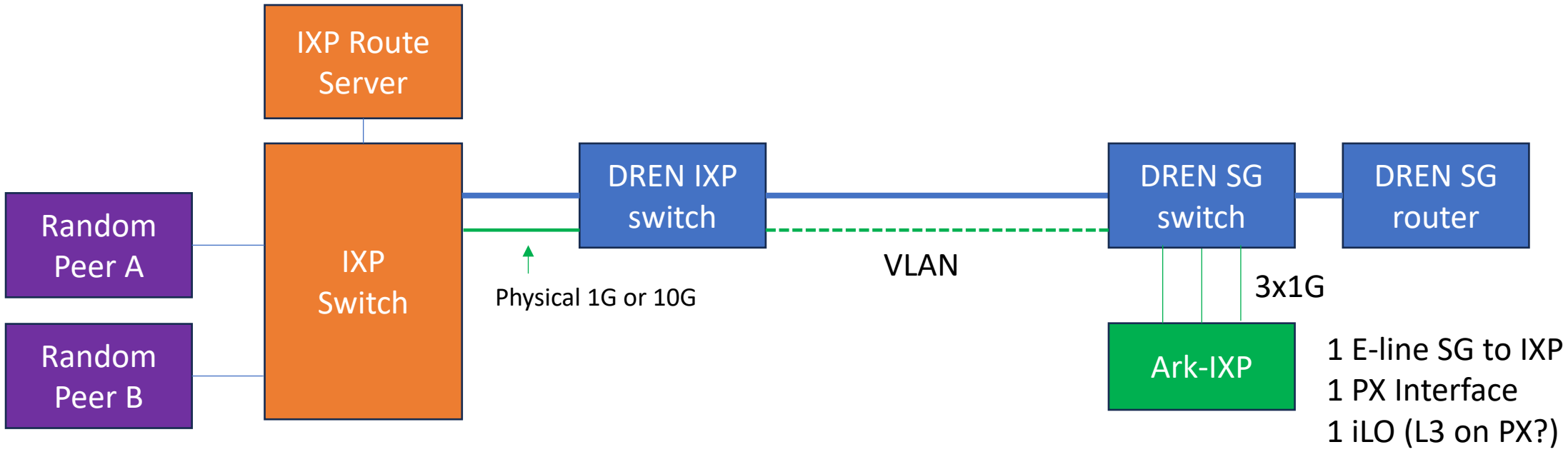


Ark-IXP at the Exchange

separate exchange port



Ark-IXP at the Security Gateway
remote rack space (“free”)



Thank you,
Phil.Dykstra.ctr@dren.hpc.mil