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Research Article

IMPORTANCE OF COST ANALYSIS FOR INTERNATIONAL MPLS WAN

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ABSTRACT

In the field of WAN Capacity Planning, cost analysis of International MPLS plays a pivotal role to have greater visibility of historical cost which will help Enterprise customers in allocating budget for forthcoming years matching with last mile local loop technology vs WAN Bandwidth. Country wise cost comparison provides clarity to the IT Department to define their strategy in which country Primary and Backup Data Center can be hosted to Optimize Network Cost. Cost comparison with various WAN Solution options will bring visibility what technology customer will chose in which country to get both technology and cost optimized for better WAN Service Delivery.

Key Words:

WAN Technologies, Per Mbps Monthly
Recurring Cost, Local Loop Connection

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INTRODUCTION

Until SD WAN (Software Define Wide Area Network) is coming in Matured way in the international level and more and more customers are availing that service to establish SD WAN as Industry accepted next Generation Framework to provide cost and technology benefit, MPLS is the technology that is accepted worldwide to provide best in class service considering Quality of Service (QOS), Guaranteed Bandwidth, SLA driven Service with Application Performance Assurance. Since Cost of last mile WAN solution is decreasing, it is worth to compare country specific per Mbps WAN BW cost for Predictive analysis which will help Enterprise customer who operates internationally to perform Capacity planning for the new future selecting right last mile option. The current Study has been conducted with 14 Countries in Asia Pacific Zone for International MPLS Links through Single Provider approach.

Literature Survey

Based on the survey documents publicly available, Network Architects, System Administrators, CIOs, Decision Makers of IT Departments are interested to know about trend of Per Mbps Bandwidth Cost of International MPLS with the technology migration from E1/T1/ DS3 Leased line to Ethernet so that they can have enough transparency for designing future WAN Solution (A). There is a Gap for demand and Supply, very few

research paper has shown the trend of Bandwidth Cost but no elaborate cost comparison has been provided for the Continent.

Patrick Christian Jul 7, 2017 has published an article on TeleGeography [1] showing trend of the WAN Solution which is covering MPLS for SDWAN as Cloud based service but not pure MPLS for Specific Region like APAC zone has been highlighted.

Markus Nyholm has been heighthed in his paper on Improving Network Connectivity by eploying WAN Bonding Concept in his thesis for Helsinki Metropolia University of Applied Sciences [2] showing the concept of developing technological advantage but details cost analysis or cost benefit has not been highlighted.

Tessa Parmenter has summarized Benefit of MPLS and various last mile technologies in his article in techtarget [3] but commercial comparison has not been provided with price decrement figures.

Greg Bryan highlighted in his paper for importance of Enterprise Network Benchamarking [4] In TeleGeography, where commercial aspect has been highlighted for few global countries but Asia Pac specific study has not been focused.

Andy Gottlieb, Network World [5] narrated the reason in his paper regarding the cause of MPLS cost is higher than the Internet link cost. There is high level cost idea but nothing

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specific to the APC region has been highlighted so that APAC customer can get greater visibility on the international MPLS cost decrement.

METHODOLOGY

In this study 14 Tops countries in Asia Pac Region has been Chosen for MPLS Cost Analysis. From South East Asia – India, Pakistan, Singapore, Indonesia, Malaysia, Thailand, Vietnam, Philippines, From Greater China – China, Hong Kong, Korea, Taiwan and from South Pacific – Australia and New Zealand is considered for MPLS Cost Comparison. Since in Bangladesh and Sri Lanka – International MPLS cost is very high, these two countries were not considered in the current study. Year Span from 2012 – 2108 Q1 has been considered so that in 7 years’ times pan MPLS cost comparison can be done. Around 150 MPLS WAN Circuit has been considered for Cost comparison with Speed from 128Kbps to 50Mbps. Per Mbps Bandwidth has been measured in US Dollar (USD) to have homogeneity and conversion rate from local currency to USD has been applied wherever needed. The year wise MBPS bandwidth cost are shown in subsequent figures:

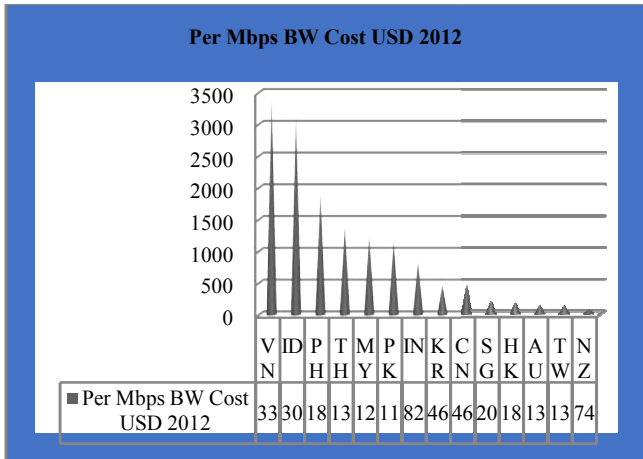


Fig 1 Countries with the per MBPS bandwidth cost in USD in 2012

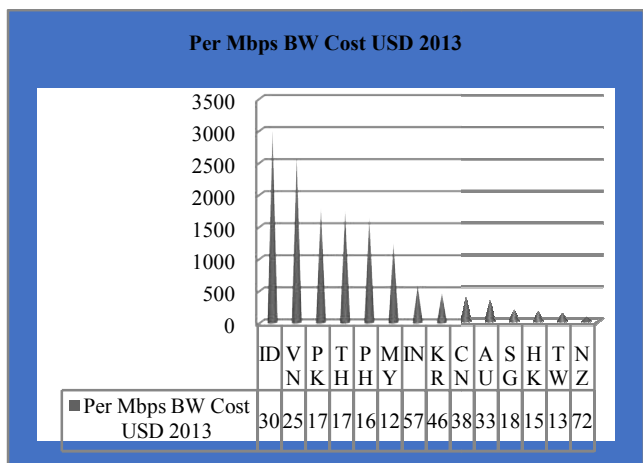


Fig 2 Countries with the per MBPS bandwidth cost in USD in 2013

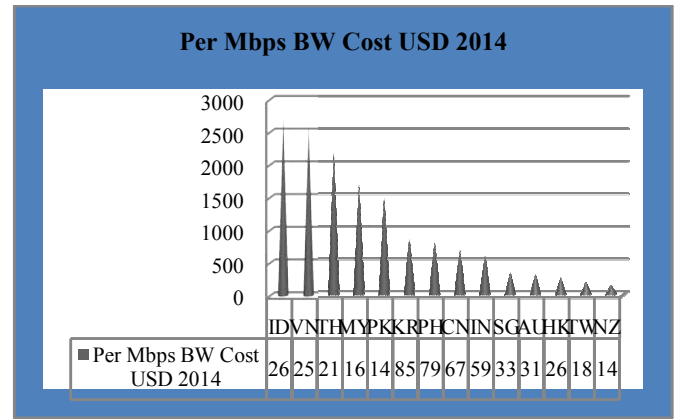


Fig 3 Countries with the per MBPS bandwidth cost in USD in 2014

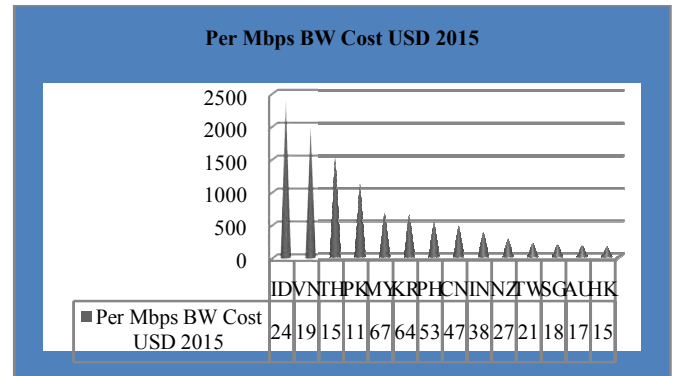


Fig 4 Countries with the per MBPS bandwidth cost in USD in 2015

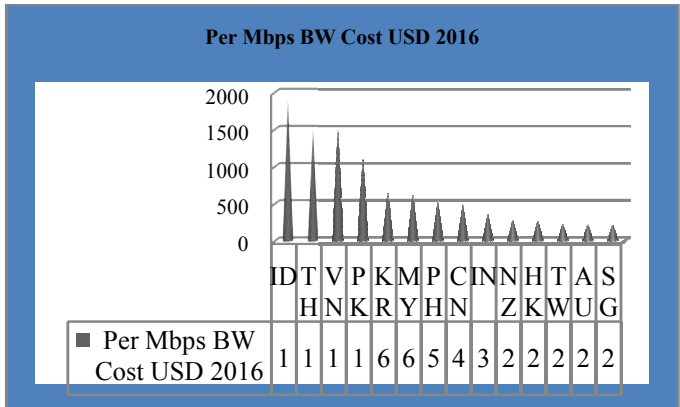


Fig 5 Countries with the per MBPS bandwidth cost in USD in 2016

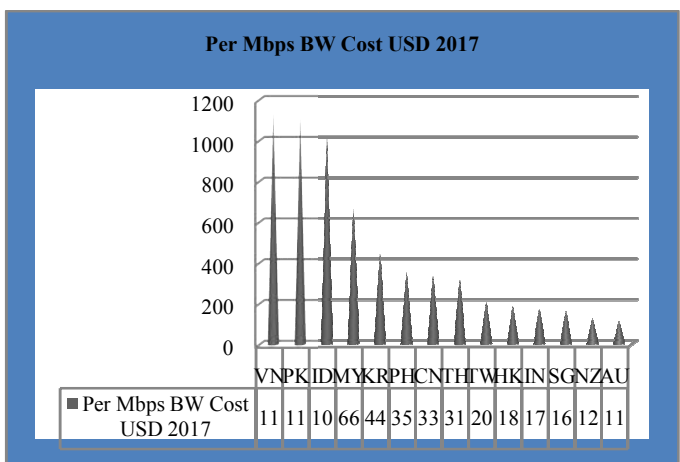


Fig 6 Countries with the per MBPS bandwidth cost in USD in 2017

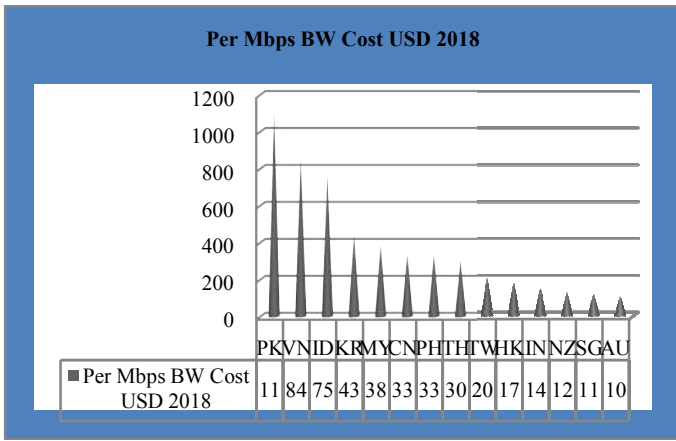


Fig 7 Countries with the per MBPS bandwidth cost in USD in 2018

The country wise MBPS bandwidth is shown in table 1.

Table 1 Average cost for MBPS bandwidth country wise

Country	Average Cost (USD) per Mbps
ID	2127.714286
VN	1998.571429
TH	1274.571429
PK	1261.571429
MY	925.5714286
PH	867.2857143
KR	563.5714286
CN	451
IN	437.2857143
SG	200.2857143
AU	197.7142857
HK	197.5714286
TW	185.2857143
NZ	156.1428571

The Country Specific MPLS Cost Comparison (2012-2018) for Asia Pacific is shown in Table 2.

Table 2 Country Specific MPLS Cost Comparison for Asia Pac Timeframe 2012-2018

Apac Country	Per Mbps WAN Link Cost (USD) for International MPLS Circuit							Average Cost
	2012	2013	2014	2015	2016	2017	2018	7 Years Span
IN	828	577	594	380	362	173	147	437.2857143
SG	207	183	336	189	211	161	115	200.2857143
TH	1374	1746	2167	1510	1510	315	300	1274.571429
ID	3097	3003	2691	2411	1929	1005	758	2127.714286
MY	1232	1232	1677	670	620	662	386	925.5714286
PK	1153	1784	1474	1105	1105	1105	1105	1261.571429
KR	463	460	850	645	645	443	439	563.5714286
TW	132	132	189	213	220	207	204	185.2857143
CN	461	387	676	476	486	334	337	451
HK	183	159	263	155	263	184	176	197.5714286
PH	1891	1633	797	530	530	356	334	867.2857143
VN	3382	2580	2580	1982	1486	1131	849	1998.571429
AU	134	337	313	174	214	110	102	197.7142857
NZ	74	72	147	274	274	126	126	156.1428571
Average	1043.64	1020.36	1053.86	765.29	703.93	450.86	384.14	

The Year by Year % of Cost Impact on Per Mbps WAN Link Cost (USD) for International MPLS is shown in Table 3.

Table 3 Year by Year % of Cost Impact on Per Mbps WAN Link Cost (USD)

APAC Country	Year by Year % of Cost Impact on Per Mbps WAN Link Cost (USD) for International MPLS							Avg Cost Impact %
	2012	2013	2014	2015	2016	2017	2018	7 Year Span
IN	828	-43.500867	2.94627383	-36.026936	-4.7368421	-52.2099	-15.02890173	-24.75953622
SG	207	-13.114754	83.6065574	-43.75	11.6402116	-23.6967	-28.57142857	-2.314349353
TH	1374	21.305842	24.1122566	-30.3184126	0	-79.1391	-4.761904762	-11.46688194
ID	3097	-3.1302031	-10.38961	-10.4050539	-19.991705	-47.9005	-24.57711443	-19.39902551
MY	1232	0	36.1201299	-60.0477042	-7.4626866	6.774194	-41.6918429	-11.05131838
PK	1153	35.369955	-17.376682	-25.0339213	0	0	0	-1.173441293
KR	463	-0.6521739	84.7826087	-24.1176471	0	-31.3178	-0.902934537	4.632003955
TW	132	0	43.1818182	12.6984127	3.28638498	-5.90909	-1.449275362	8.634708264
CN	461	-19.121447	74.6770026	-29.5857988	2.10084034	-31.2757	0.898203593	-0.384486583
HK	183	-15.09434	65.408805	-41.0646388	69.6774194	-30.038	-4.347826087	7.42356618
PH	1891	-15.799143	-51.194121	-33.5006274	0	-32.8302	-6.179775281	-23.25064254
VN	3382	-31.085271	0	-23.1782946	-25.025227	-23.8896	-24.933687	-21.35201942
AU	134	60.237389	-7.1216617	-44.4089457	22.9885057	-48.5981	-7.272727273	-4.029261842
NZ	74	-2.7777778	104.166667	86.39455782	0	-54.0146	0	22.29480803

The regression analysis between Average cost (Per Mbps WAN Link Cost (USD) for International MPLS Circuit) in X axis and Average Cost Impact percentage 7 years span (Year by Year % of Cost Impact on Per Mbps WAN Link Cost (USD) for International MPLS) in Y axis is depicted as in Fig8..

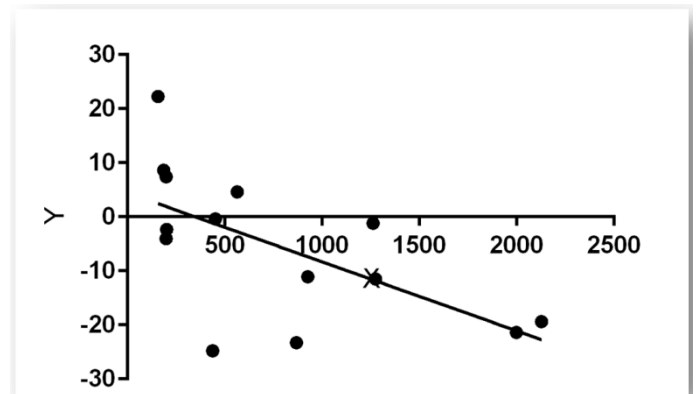


Fig 8 Regression Line considering Table 2 and 3

The outcome is

Slope -0.01277 ± 0.004696
 Y-intercept 4.448 ± 4.736
 X-intercept 348.4
 Deviation from horizontal: Significant
 Equation $Y = -0.01277 * X + 4.448$

Country	MPLS Cost Reduction %
IN	-82.24637681
SG	-44.44444444
TH	-78.16593886
ID	-75.52470132
MY	-68.66883117
PK	-4.163052905
KR	-5.183585313
TW	54.54545455
CN	-26.89804772
HK	-3.825136612
PH	-82.33738763
VN	-74.89651094
AU	-23.88059701
NZ	70.27027027

Table 12 Per Mbps WAN Bandwidth Cost (USD) for APAC Region

Year	Leased Line	Ethernet	Broadband
2018	824	180	171
2017	893	193	171
2016	1138	215	203

RESULT AND DISCUSSION

Based on the above Study, it is transparent that due to technology change from telco based leased line to Ethernet or broadband the per Mbps cost has been come down for majority of the countries. For few countries with lower bandwidth may be on telco based leased line or Ethernet / Broadband is not available in all of the locations resulting per Mbps cost increase.

Benefit of Ethernet is the flexibility, easy to upgrade with desired speed. For Example, if 100Mbps is the access link, on Ethernet Port can be are of 2Mbps, 4Mbps, 6Mbps, 8Mbps, 10Mbps, 20Mbps, 30Mbps, 40Mbps, 50Mbps, 60Mbps, 70Mbps, 80Mbps, 100Mbps. But in Case of Telco based solution cost is much higher for 10Mbps where DS3 45Mbps is throttled to 10Mbps Port.

CONCLUSIONS

As per the above study, where 50% cost or more reduction is observed, with Similar payment structure of 2012 country can International MPLS WAN link in with Double Bandwidth. Countries where Cost reduction is not noticeable, Enterprise customer should interact with WAN Service provider for adapting Ethernet / Broadband for MPLS last mile to have overall reduction of cost.

For Broadband – there may be a concept of contention Ratio, 1:1 or 1:2 Contention ratio is always preferred compared to 1:8 contention ratio to avoid performance issue due to improper function of QOS (Quality of Service). Ethernet is having great advantage of flexibility, easy to upgrade, Enterprise customer should demand WAN Service provider to migrate T1/E1/DS3/Multiple T1/E1 Bundle to convert to Ethernet to get technological and Commercial Benefit.

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Out of scope eliminate of the current research

1. International MPLS circuit of Single provider has been Considered for 14 APAC countries. For Multi Provider Scenario – cost may vary 15 – 20% depending on local presence of the provider in every country.
2. Bangladesh and Sri Lanka is out of Scope of this Study.
3. Internet based VPN Service is not included, only Monthly Recurring cost (USD) of International MPLS links has been considered.
4. No One Time Charge has been Considered.
5. Cost of SD WAN Overlay solution is out of scope of the present study.

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