



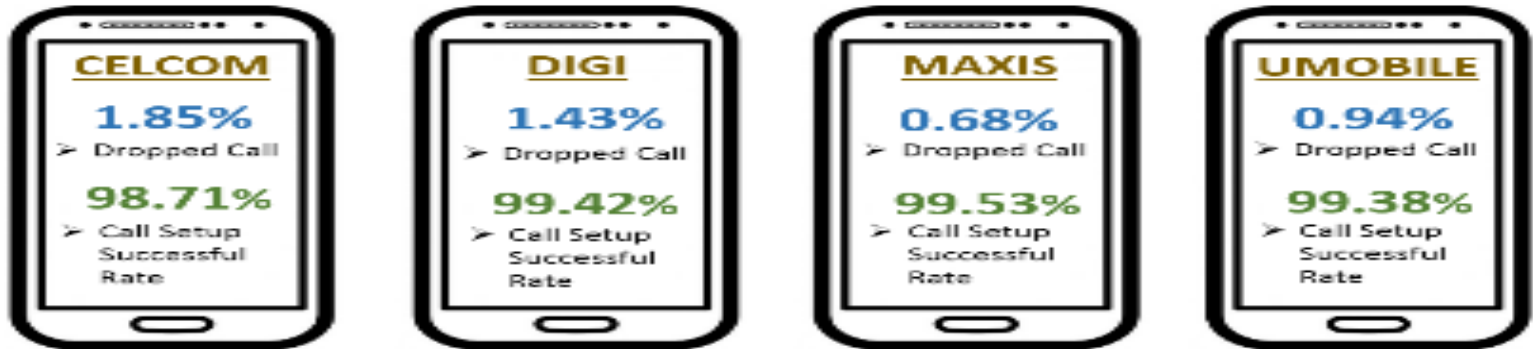
**QUALITY OF SERVICE NETWORK
PERFORMANCE RESULTS FOR
2016**

FUNDAMENTALS

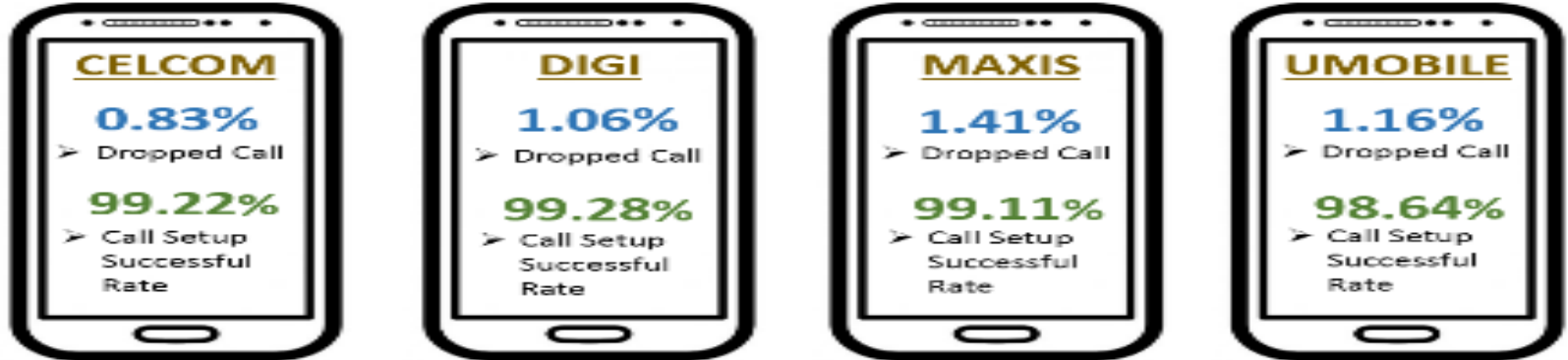


- The results shown are with accordance to the Mandatory Standards (MS) set forth effective Feb 2016. Click **(a)** for details of the MS.
- CELCOM, DIGI, MAXIS and UMOBILE is involved in Spectrum re-farming activities beginning late 2016 to late 2017. RE-farming exercises shall cause minor disruptions during these periods.
- The MCMC will publish the 2017 performance in January 2018.

Public Cellular (PCS) Performance 2016



1. Average measurement on Designated routes from Jan – Dec 2016



2. Nationwide average measurement from Jan – Dec 2016

Designated Routes :Putrajaya, Cyberjaya, MEX Highway, KLIA to Subang Airport via ELITE highway, Subang Airport to Jalan Duta via NKVE highway

Nationwide: All states averaged in whole of Malaysia

Drop call rate (**DCR**) : Not more than 2% for PR and not more than 3% for Nationwide

Call Setup/network availability (**CSSR**): At least 95%

DCR results by region



NRO (Perlis/Kedah/Penang)

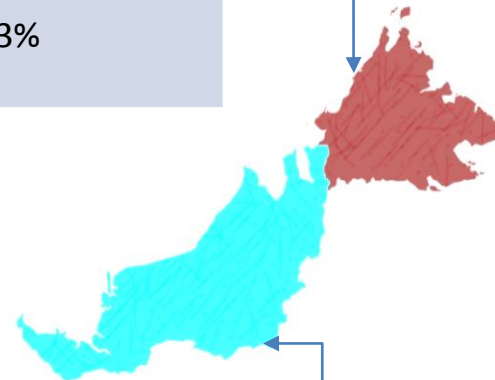
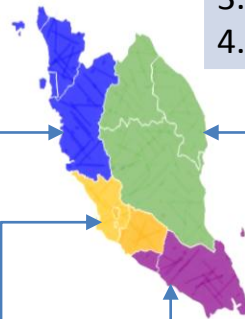
1. Celcom - 0.86%
2. UMobile - 1.14%
3. Digi - 1.31%
4. Maxis - 1.47%

ERO (Kelantan/Terengganu/Pahang)

1. Celcom - 0.74%
2. Digi - 1.12%
3. Umobile - 1.23%
4. Maxis - 1.71%

SBRO (Sabah)

1. Celcom - 1.04%
2. Digi - 1.43%
3. Umobile - 1.66%
4. Maxis - 1.99%



CRO (KL/Selangor/N.Sembilan)

1. Digi - 0.97%
2. UMobile - 1.10%
3. Maxis - 1.14%
4. Celcom - 1.21%

SRO (Johor/Melaka)

1. Digi - 0.38%
2. Celcom - 0.44%
3. Umobile - 0.71%
4. Maxis - 0.96%

SWRO (Sarawak)

1. UMobile - 0.53%
2. Maxis - 0.64%
3. Digi - 0.64%
4. Celcom - 0.65%

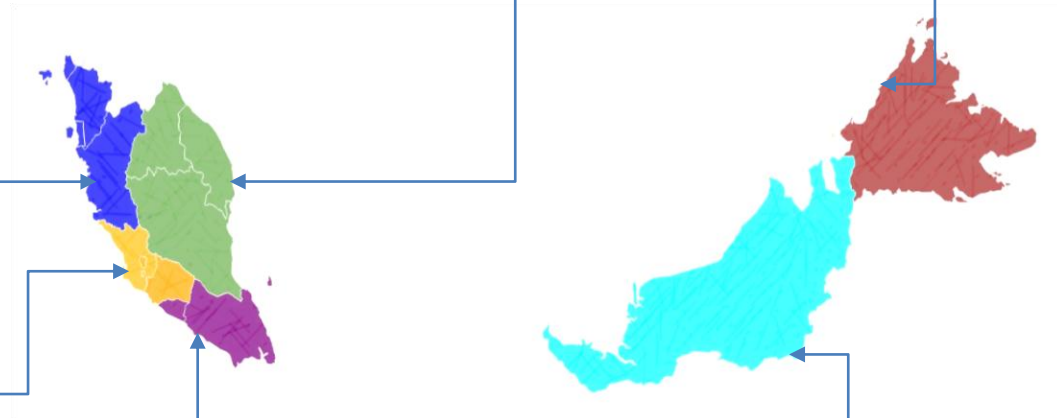
CSSR results by region



NRO	
1.	Digi - 99.23%
2.	Maxis - 99.06%
3.	Celcom - 99.06%
4.	Umobile - 98.95%

ERO	
1.	Digi - 99.58%
2.	Celcom - 99.38%
3.	Maxis - 98.58%
4.	Umobile - 96.99%

SBRO	
1.	Celcom - 99.66%
2.	Maxis - 99.53%
3.	Umobile - 99.26%
4.	Digi - 98.97%



CRO	
1.	Digi - 99.52%
2.	Maxis - 99.46%
3.	UMobile - 99.27%
4.	Celcom - 99.04%

SRO	
1.	Celcom - 99.44%
2.	Digi - 98.94%
3.	Maxis - 98.55%
4.	Umobile - 97.19%

SWRO	
1.	Maxis - 99.71%
2.	Umobile - 99.59%
3.	Digi - 99.48%
4.	Celcom - 98.61%

WIRED Broadband Performance 2016



Service Provider	Throughput(Copper)		Throughput (Fibre)		Network Latency	
	Upload	Download	Upload	Download	Latency	Packet Loss
TM	98.08	85.77	87.83	86.12	88.95	1.81
Maxis	93.87	94.23	95.58	94.04	96.36	0.48
TIME	-	-	62.19	82.84	100	3.28

Wired broadband network performance results

Download Throughput(DSL) Performance by State

Total Percentage of Compliance

Maxis : 84.6%
TM : 46.1%



Download Throughput (Fibre) Performance by State

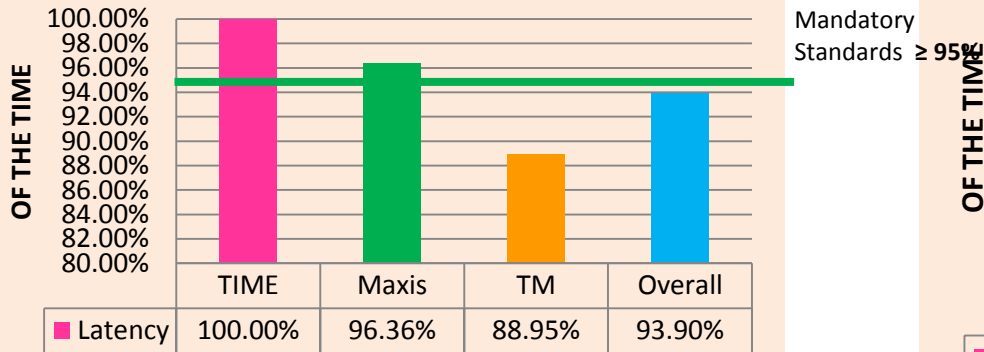
Total Percentage of Compliance

Maxis : 91.5%
TM : 63.0%
TIME : 71.4%



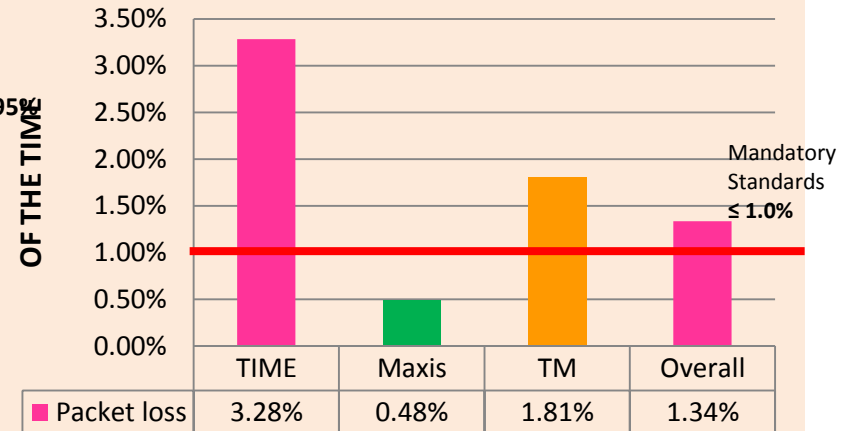
WIRED Broadband (Packet Loss and Latency)

**Mandatory Standards (Latency)
Wired Broadband 2016**



Achievement – Average of 93.90%

**Mandatory Standards (Packet Loss)
Wired Broadband 2016**



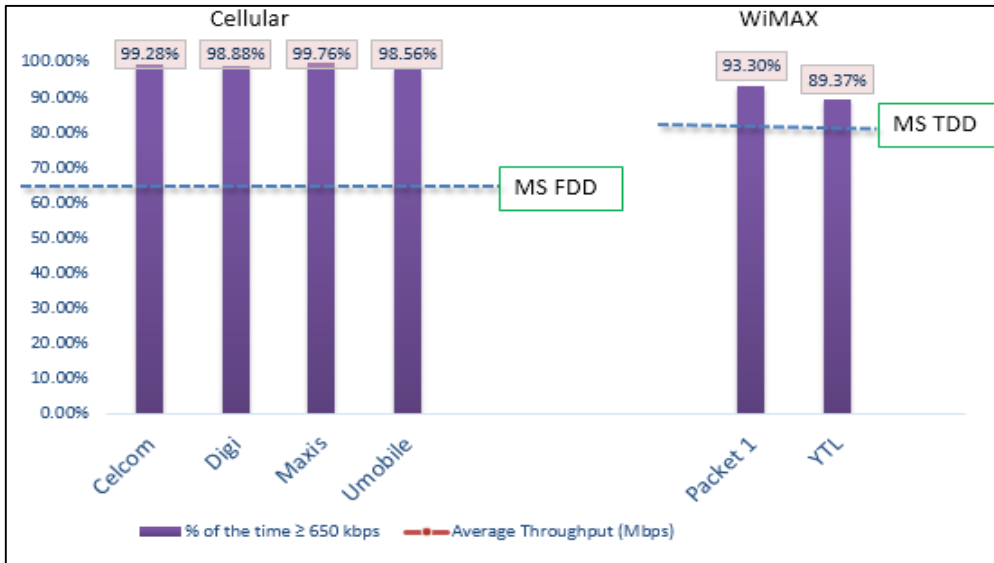
Achievement – Average of 1.34%

Average Speed by Telco

No of Locations	SP	Average Speed (Mbps)	Package Offered
66	TM	10.159	1,2,4,5,8,10,20,30,50
60	Maxis	10.051	1,2,6,8,10,20,100
7	TIME	66.963	30,50,100

* Average speed is calculated based on location tested with respect to the subscription

Wireless Broadband Performance 2016

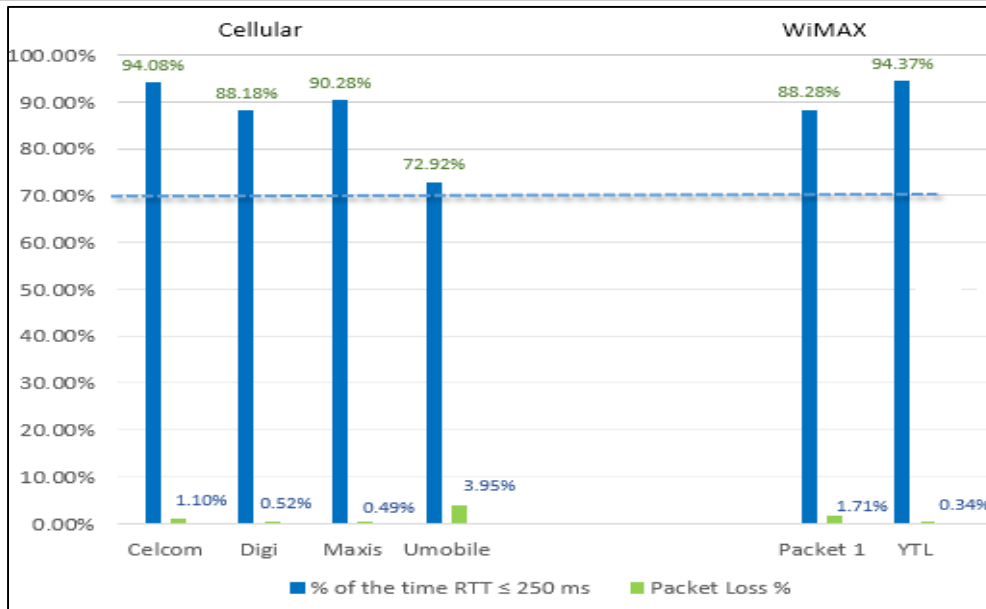


Wireless broadband **throughput**

At least (\geq) 650 kbps for:

$\geq 65\%$ of the time for **Cellular/Mobile**

$\geq 80\%$ of the time for **Wimax./Fixed wireless.**



Wireless broadband network latency and packet loss

1. Latency:

- Network latency must not be more than (\leq) 250ms for **70% of the time**

2. Packet Loss

- Packet loss must not be more than (\leq) 3%

REGIONAL ASSESSMENT

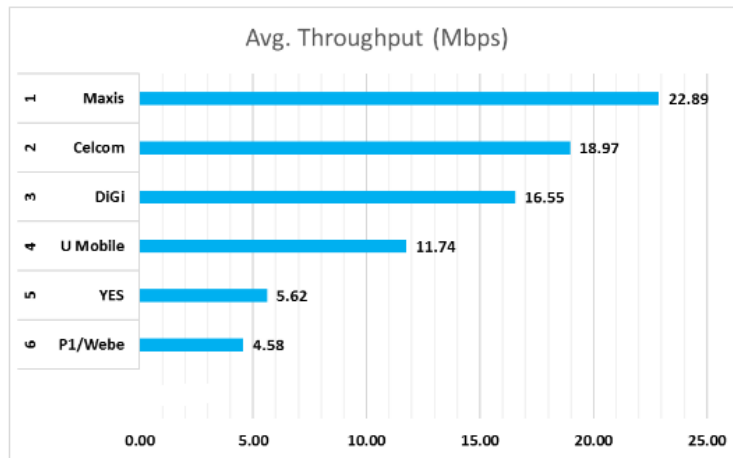


Quarter	Region	No of test points.	Test Area	Summary Per Region (Avg. Throughput Rank from 1 st to Last)																								
Q1	Central Southern	Central: 62 Southern: 21 Total = <u>83</u>	KL, Petaling, Gombak, Hulu Selangor, Hulu Langat, Klang, Sepang, Seremban, Port Dickson, Melaka, Muar, Batu Pahat, Johor Bahru	<p>Central Avg. Throughput:</p> <table border="1"> <tr> <td>Celcom:</td> <td>Maxis:</td> <td>Digi:</td> <td>UM:</td> <td>YTL:</td> <td>P1:</td> </tr> <tr> <td>24.07</td> <td>21.25</td> <td>16.34</td> <td>14.61</td> <td>7.22</td> <td>3.65</td> </tr> </table> <p>Southern Avg. Throughput:</p> <table border="1"> <tr> <td>Maxis:</td> <td>Celcom:</td> <td>UM:</td> <td>Digi:</td> <td>YTL:</td> <td>P1:</td> </tr> <tr> <td>21.11</td> <td>19.52</td> <td>16.32</td> <td>15.85</td> <td>6.83</td> <td>4.66</td> </tr> </table>	Celcom:	Maxis:	Digi:	UM:	YTL:	P1:	24.07	21.25	16.34	14.61	7.22	3.65	Maxis:	Celcom:	UM:	Digi:	YTL:	P1:	21.11	19.52	16.32	15.85	6.83	4.66
Celcom:	Maxis:	Digi:	UM:	YTL:	P1:																							
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21.11	19.52	16.32	15.85	6.83	4.66																							
Q2	Northern	46	Kangar, Arau, Jitra, Alor Setar, Sg Petani, Bukit Mertajam, Pulau Pinang, Butterworth, Kuala Kangsar, Ipoh, Manjung, Teluk Intan	<p>Northern Avg. Throughput:</p> <table border="1"> <tr> <td>Maxis:</td> <td>Digi:</td> <td>Celcom:</td> <td>UM:</td> <td>P1:</td> <td>YTL:</td> </tr> <tr> <td>22.75</td> <td>18.40</td> <td>18.17</td> <td>9.51</td> <td>4.72</td> <td>4.22</td> </tr> </table>	Maxis:	Digi:	Celcom:	UM:	P1:	YTL:	22.75	18.40	18.17	9.51	4.72	4.22												
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22.75	18.40	18.17	9.51	4.72	4.22																							
Q3	Eastern	53	Kuala Krai, Kota Bharu, Pengkalan Chepa, Tumpat, Machang, Tanah Merah, Chukai, Kuala Terengganu, Permaisuri, Hulu Terengganu, Marang, Bentong, Temerloh, Kuantan, Pekan, Maran	<p>Eastern Avg. Throughput:</p> <table border="1"> <tr> <td>Maxis:</td> <td>Celcom:</td> <td>Digi:</td> <td>UM:</td> <td>P1:</td> <td>YTL:</td> </tr> <tr> <td>27.83</td> <td>17.44</td> <td>16.20</td> <td>7.19</td> <td>5.65</td> <td>5.50</td> </tr> </table>	Maxis:	Celcom:	Digi:	UM:	P1:	YTL:	27.83	17.44	16.20	7.19	5.65	5.50												
Maxis:	Celcom:	Digi:	UM:	P1:	YTL:																							
27.83	17.44	16.20	7.19	5.65	5.50																							
Q4	Sarawak Sabah Central	Sarawak: 24 Sabah: 21 Central: 29 Total = <u>74</u>	Kuching, Lundu, Kota Samarahan, Kota Kinabalu, Inanam, Kota Belud, Putatan, Petagas, Tuaran, Tamparuli. Additional Central test: Petaling, KL, Klang, Sepang, Seremban.	<p>Sarawak Avg. Throughput:</p> <table border="1"> <tr> <td>Maxis:</td> <td>UM:</td> <td>Digi:</td> <td>Celcom:</td> </tr> <tr> <td>19.29</td> <td>16.62</td> <td>16.34</td> <td>7.88</td> </tr> </table> <p>Sabah Avg. Throughput:</p> <table border="1"> <tr> <td>Maxis:</td> <td>Digi:</td> <td>UM:</td> <td>Celcom:</td> <td>YTL:</td> <td>P1:</td> </tr> <tr> <td>20.73</td> <td>13.26</td> <td>10.41</td> <td>8.78</td> <td>5.98</td> <td>1.98</td> </tr> </table>	Maxis:	UM:	Digi:	Celcom:	19.29	16.62	16.34	7.88	Maxis:	Digi:	UM:	Celcom:	YTL:	P1:	20.73	13.26	10.41	8.78	5.98	1.98				
Maxis:	UM:	Digi:	Celcom:																									
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2016 RESULTS

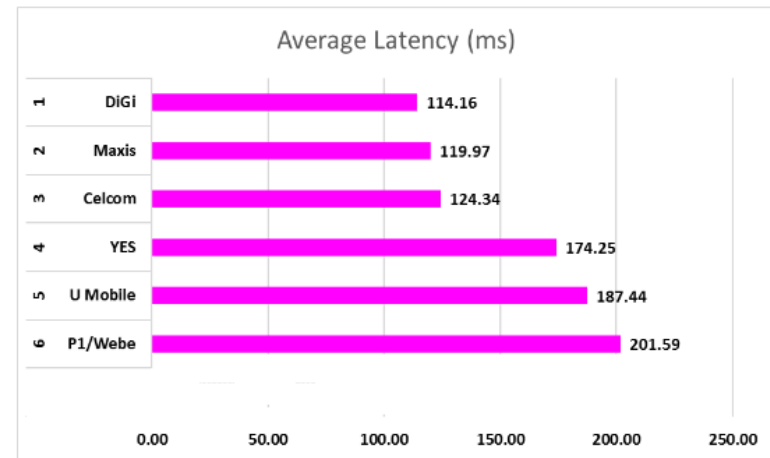
NATIONWIDE THROUGHPUT RANKING

- Results shown below are based on throughput measurement conducted on-site by MCMC using EXFO System.



NATIONWIDE NETWORK LATENCY RANKING

- Results shown below are average round trip time taken by a packet travelling from User End to MyIX and back.



Performance Summary



- (a) For **PCS** (voice call), all operators complied with the MS QoS on identified routes and nationwide on both DCR and CSSR requirements.
- (b) For **Wired Broadband**, only Maxis passed all metrics of the MS.
- (c) TIME did not meet the MS due to **Awareness** on the change of subscriber's modems in meeting the 100Mbps mark and not due to network.
- (d) TM failed to meet all 5 metrics of the MS.
- (e) For **Wireless broadband** all operators complied with the MS on all metrics except U Mobile
- (f) U Mobile recorded **high packet loss** with 3.95%. U Mobile is the newest entrant in the Cellular TEIR 1 group. For **immediate coverage** U Mobile shared Maxis's radio access networks, hence could not meet the 3% packet loss target.
- (g) Celcom announced that they conducted equipment modernization/ swapping activities during 2nd half of 2016 that impacted its performances.
- (h) According to the 2016 mobile network performance, Maxis recorded the highest throughput while Digi is the fastest network.
- (i) Detail and semblance analysis can be found in **(b)**.