

MOTC/Ooredoo Joint Taskforce

Ooredoo 900MHz Spectrum Interference Compensation & Resolution Process

Solution and Remediation

Prepared by Ooredoo



Confidentiality and proposal without prejudice

The parties to the Joint Taskforce, the Ministry of Transport and Communications (MOTC) on one side and Ooredoo Asian Investments Pte Ltd, Ooredoo Asia Pte Ltd and Ooredoo Myanmar Limited (jointly Ooredoo) on the other side, have committed to keep all the relevant information, including but not limited to the agreed timetable and substance of all negotiations, confidential and to not disclose them to any third party without prior consent of the other party.

This slide deck includes a proposed compensation solution which Ooredoo is providing on a without prejudice basis and it is provided for the sole purpose of facilitating the conclusion of an agreement between the parties. This means that Ooredoo has, as a gesture of good faith in the negotiations that are ongoing between the parties and for this sake only, reduced the amount of its claim. Ooredoo has not in any way agreed or admitted that the costs and losses are lower than previously stated. Should the parties be unable to reach an amicable agreement, then Ooredoo is free to make a claim based of the actual costs and losses and the MOTC is legally prevented from making any reference to any part of the proposed compensation solution which Ooredoo is now providing on a without prejudice basis.

Ooredoo is a major contributor to the Myanmar economy

To date:

- Ooredoo is committed to continuing to invest in Myanmar to enrich the digital lives of the people of Myanmar.
- Ooredoo has contributed over 2.4 billion USD in foreign investment in Myanmar.
- 1.2 billion USD paid in cash to Government for spectrum.
- Ooredoo has also invested significant amounts in CSR projects across the country and intends to continue to do so in line with its commitment to the development of Myanmar.
- More than 92% population coverage achieved for mobile voice and data in just five years.
- Network performance and speeds are best in Myanmar and best in class in ASEAN.
- Deployed around 6,000 sites and 15,000 km's of backbone and 420 km's of "last mile" fibre .
- New technology rolled out – with 4G coverage in 300 townships.

Ooredoo has delivered on the promises made during the license bid in 2013 to the Myanmar Government.

Background to interference problem suffered by OML

- Ooredoo Myanmar Limited (OML) has suffered high interference in the 900 MHz band from the time of launch in August 2014. The interference has had a severe impact on OML's business and OML has been forced to make big investments in mitigating actions.
- When bidding for the licence, following the Invitation to Tender (ITT), Ooredoo had expected to be awarded clean 900 MHz spectrum.
- As interference could be expected in regions that deploy 850 and 900 MHz mobile networks in parallel, questions were raised under the ITT process in this regard.
- Interference experiences from other countries with similar challenges, including Australia, Thailand, Indonesia, and Malaysia, has led to the interference issue being covered in a number of technical review documents (e.g. APT Report on "Migration strategy of GSM to mobile broadband", No. APT/AWG/REP-53, September 2014).
- Ooredoo Myanmar Limited is the only operator in Myanmar to be severely affected by 900MHz interference. This is likely due to the fact that OML used the 900 MHz band for 3G services and the fact that OML's spectrum allocation is close to the 850 MHz.

Recap of agreed solution and remediation process

- Following an exchange of commitment letters on 26 February 2019 a Joint Taskforce has been formed between Ooredoo and MOTC with the following aim:

To discuss the impact of the interference on OML's business, appropriate compensation to recognize the impact of the interference on OML's business performance and value, and a path forward to eliminate to the greatest extent possible, ongoing interference in the 900 MHz band.

- The parties agreed a 6 months timeline from 1 March 2019
- The review was divided into three different work streams:

1. Diagnosis

Examining the technical problems, impact and quantification of the compensation

2. Remediation

The road to clean, interference free spectrum

3. Compensation

Appropriate and acceptable compensation

1. Diagnosis of interference problems

- The interference suffered by OML is due to the CDMA850 operator and the use of illegal repeaters.

A detailed diagram showing the affected spectrum bands is included in Appendix 1.

- The interference affects more modern technologies such as LTE and UMTS more than older technologies such as GSM and OML is the only operator in Myanmar to be severely affected by 900MHz interference.
- Impact on OML's customers
 - Customers are unable to make or receive calls or browse the internet. This occurs on an intermittent basis.
 - The interference does not always cause the above problems as it depends on the number of users in the cell, how close the user is to the base station and if (when a repeater is causing the problem) a repeater is in use.
 - For the user, the device may be showing full coverage (full bars) even though no services work.
 - As the problems for the users only appear sometimes and not everywhere it is natural that the operator is blamed for the problems.
 - For the operator it is almost impossible to inform customers and the market about the problem, without causing itself further damage within the market.
 - For customers, the easiest way of solving the problem is to switch to another operator, something very simple in a prepaid market.
 - New customers, hearing about OML's poor service and reputation, would normally chose an alternative operator from the start, even if competing operators do not provide the same type of service or data speeds.

2. Remediation Solution

Ooredoo proposes the following steps to to ensure clean 900MHz spectrum:

1. A clearly defined and stable guard band – ideally in the less valuable spectrum band. (Responsible = PTD).
2. The installation of TX filters to the CDMA/UMTS/LTE850 Base Stations. (Responsible = 850 Operators).
3. The installation of RX filters to the GSM/UMTS/LTE900 Base Stations. (Responsible = 900 Operators).
4. The removal of illegal repeaters from the market and from the ground. Active policing of spectrum by operators and the regulator (Responsible = PTD and the **Joint PTD/Ooredoo Remediation Sub Group**).

3. Compensation - costs and losses suffered by OML of USD494m

There are generally three categories of compensation costs and losses to consider:

Costs Incurred due to Interference

Costs incurred by OML resulting from actions taken to lessen or mitigate the impact of interference.

(Detailed explanation given in Appendix 2).

USD119m

Loss from Existing Subscribers

Income lost as a result of existing subscribers not using OML's service as often as it otherwise would have done due to interference. (Detailed explanation given in Appendix 3).

USD77m

Loss from Potential Subscribers

Income lost as a result of losing potential subscribers to competitors due to interference.

(Detailed explanation given in Appendix 4).

USD298m

**TOTAL
Costs & Losses**

USD494m

Proposed compensation solution

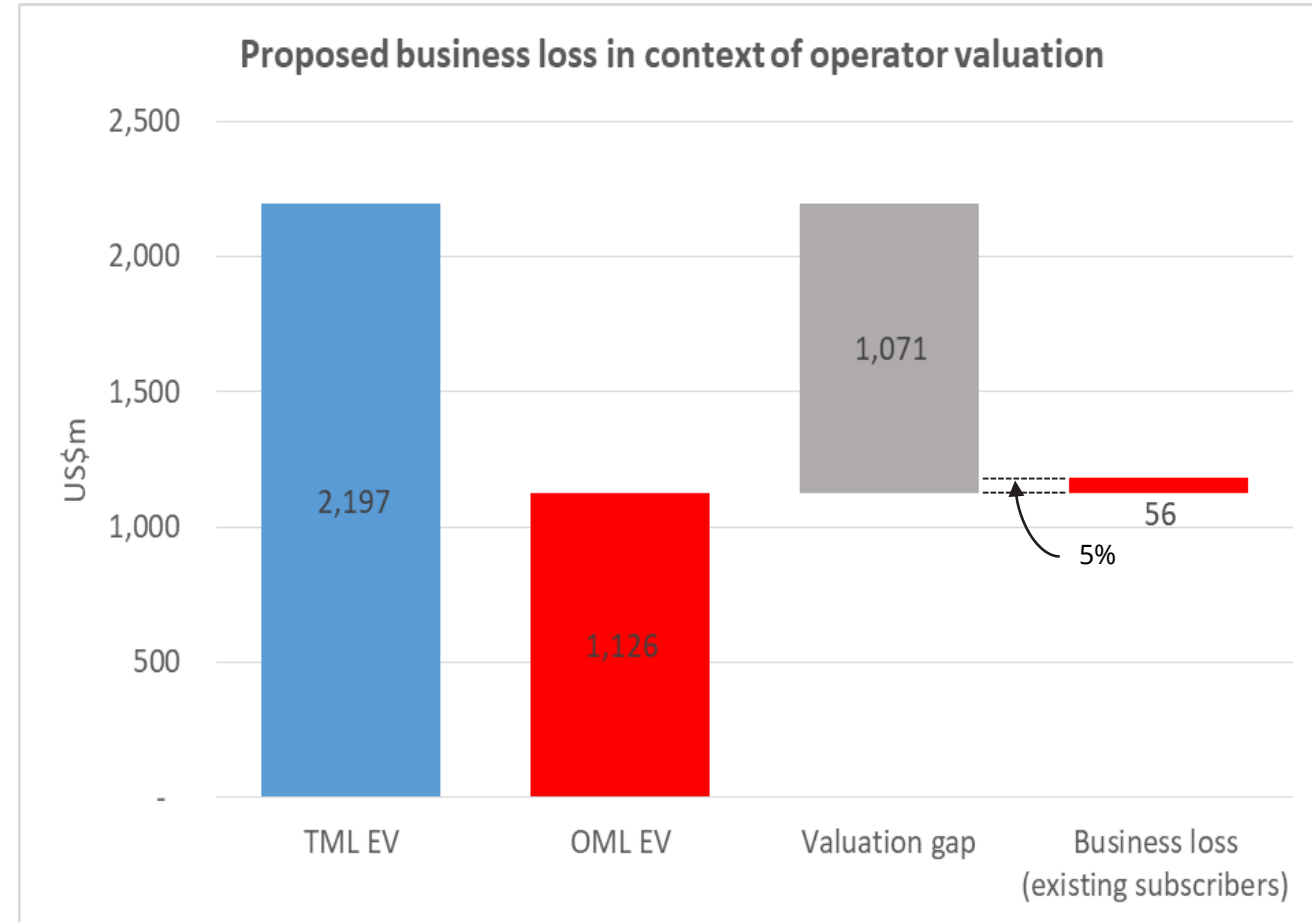
OML has incurred direct costs, and suffered losses, due to interference within OML's 900 MHz spectrum band totalling **USD494m**.

- **Remediation** - The parties have agreed to set up a sub-group to the Joint Taskforce that will agree on the steps necessary to resolve the interference issue. This should be an integral part of the final resolution of the interference matter.
- **Form of compensation** – Ooredoo proposes that compensation is provided in the form of a Credit Note for OML to use against future MOTC/PTD payments.
- **Quantification** - In order to facilitate the conclusion of an amicable agreement, Ooredoo proposes, without prejudice, that compensation for the costs and losses suffered by OML should be set at **USD175m**. Considering that the proposed settlement amount is a significant reduction compared to the actual costs and losses suffered it should be seen as fair and reasonable in a settlement.
- The proposed settlement amount consists of the mitigation costs of **USD119m** and a revised loss from existing subscribers of **USD56m**. (see Appendix 3 for details). The lost profits from potential subscribers (**USD298m**) has been set aside in other words “parked”, in order to facilitate reaching an settlement.

| Components of loss | Costs and losses suffered USDm | Proposed settlement USDm |
|--------------------|--------------------------------|--------------------------|
| Mitigation | 119 | 119 |
| Existing subs | 77 | 56 |
| Potential subs | 298 | (Parked) |
| Totals | 494 | 175 |

The proposed settlement figure is small in relation to the OML value gap versus competition.

- There is a substantial difference in the Enterprise Value (total monetary value) of Telenor's Myanmar business when compared to Ooredoo's. This is primarily the result of their much larger revenue and customer market share.
- The gap in valuation is estimated to be in excess of **USD1bn**. The methodology to support this relative valuation is detailed in Appendix 5.
- From the proposed settlement figure only **USD56m** relates to the loss of value from Ooredoo's existing subscribers caused by the interference suffered. This represents only 5% of the current value gap versus the competition.
- The interference mitigation costs incurred by OML of **USD119m** are not relevant to the comparison here as they represent cash paid out to try to minimise the service impact on OML's customers in the absence of a resolution of the interference issue.



Note1: Details of the valuation methodology can be found in Appendix 5.

Next steps

- Ooredoo has provided a fair, reasonable and transparent compensation proposal which we believe should be acceptable to all parties.
- The parties have also agreed to form a remediation sub-group tasked with setting out the steps, to be part of the compensation solution, to ensure, to the greatest extent possible, interference free 900MHz spectrum for OML in the future.
- Ooredoo suggests to schedule a working group meeting on 21st May and an additional high level meeting at the end of May to close the matter.
- Ooredoo sincerely hopes that the parties are able to reach an agreement on our proposal to be concluded at a meeting between H.E. The Minister and the Ooredoo Group CEO Sh. Saud.



Thank You

Appendix 1 – The CDMA850 to 900MHz Interference Problem

Exhibit 3: Frequency Bands 3GPP – 800-900 MHz Band

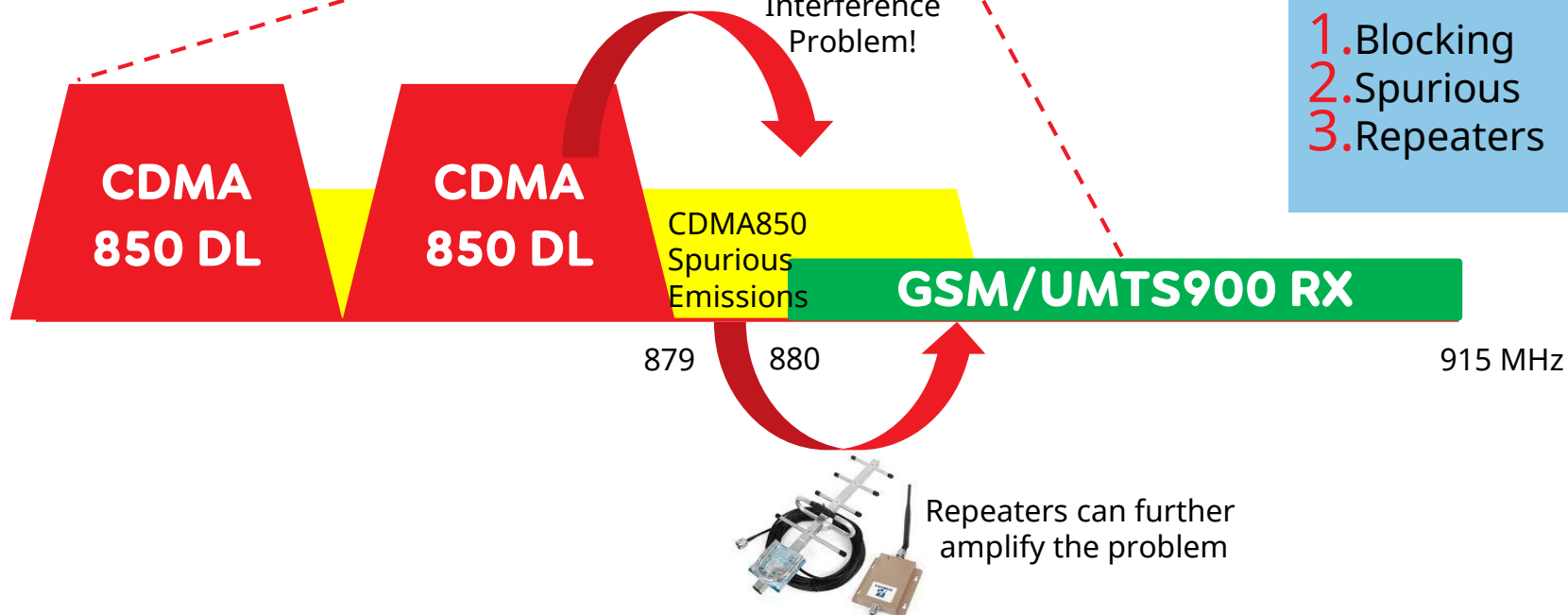
| | 790 | 800 | 810 | 820 | 830 | 840 | 850 | 860 | 870 | 880 | 890 | 900 | 910 | 920 | 930 | 940 | 950 | 960 |
|------------|-----|-----|-----|--------|-----|-----|-----|-----|----------|--------|-----|-----|-----|-----|----------|-----|-----|-----|
| LTE Band 5 | | | | Uplink | | | | | Downlink | | | | | | | | | |
| | | | | 824 | | 849 | | | 869 | | 894 | | | | | | | |
| LTE Band 8 | | | | | | | | | | Uplink | | | | | Downlink | | | |
| | | | | | | | | | | 880 | | 915 | | 925 | | | | 960 |

Problem Area!

Well known
Interference
Problem!

Three Interference Effects

1. Blocking
2. Spurious
3. Repeaters



Appendix 2 – OML Interference Mitigation Actions & Costs (1)

In 2014-2016, given that more and more of Ooredoo's UMTS900 sites were coming on air with severe uplink interference and this was causing severe quality issues in the network, Ooredoo took the following decisions/actions:

1. To lock* U900 sectors with extreme service affecting interference. (Starting August 2014)
2. To specify and deploy a tighter blocking filter (roll off 880 – 882.5MHz) on new sites. (Starting October 2014)
3. To replace the original (version 1) blocking filters on the U900 sites with interference (Starting October 2014)
4. To infill areas of lost coverage with additional new UMTS2100 sites. (April 2015 onwards).
5. The removal of illegal repeaters with the help of PTD (2016 onwards).

Mitigating Actions Taken

| | |
|-------------------------|-------|
| • Sectors Locked | = 191 |
| • Filter swaps | = 151 |
| • Infill Sites deployed | = 382 |
| • Repeaters Removed | = 46 |

*Locked sectors means lost coverage. In order to serve customers Ooredoo needed to replace the coverage using 2100 MHz sites.

- 382 infill sites were installed for coverage infill because of missing 900MHz coverage due to locked 900 MHz sites (339 infill sites in Yangon)
- The new infill sites require
 - Backhaul Transmission
 - Power
 - Upgrade to later technologies (LTE) to maintain the grid
 - Significant unexpected extra CAPEX and OPEX

Appendix 2 – OML Interference Mitigation Actions & Costs (2)

The table below shows the summary of the mitigation costs with a total of USD119m

Summary

| Components (Actual) | Total US\$m |
|-------------------------------------|--------------|
| Site CAPEX | 31.6 |
| Operating costs | 78.9 |
| Filter swap costs | 0.2 |
| Other costs | 2.4 |
| Without interest/discounting | 113.1 |
| Site CAPEX | 44.2 |
| Operating costs | 71.0 |
| Filter swap costs | 0.3 |
| Other costs | 3.4 |
| With interest/discounting | 118.9 |

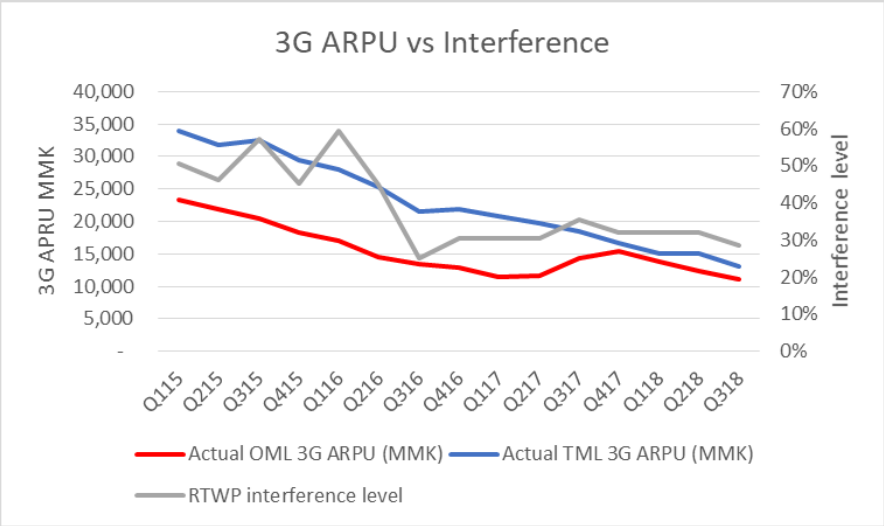
Appendix 3 - Lost income from existing subscribers

- Subscribers naturally migrate to operators who provide a superior quality of service given similar pricing and coverage capabilities of the operators. When an operator suffers interference, the quality of service declines and subscribers switch their usage to competing networks.
- This market feature is supported by industry data: The chart below shows the relationship between interference levels and 3G ARPU for Ooredoo and TML. We can see that Ooredoo had lower usage than TML before 2016 and that as the interference levels dropped over time, 3G ARPUs between Ooredoo and TML converged.
- Calculation of loss: Losses from existing subscribers are based on lower historic usage from affected OML subscribers due to interference versus average market usage as benchmarked by comparable Telenor Myanmar (TML) subscribers not affected by interference.
- The initial calculation which attributes all losses to interference is shown in the table below with a total of **USD77m.**

| Summary | 2014-2023 |
|-------------------------------|-----------|
| Loss (USD '000) | 54,185 |
| Loss with interest (USD '000) | 77,109 |

- As other factors also influence the relative performance, we assume the proportion of losses attributed to interference is around 73% (see next slide for explanation). The revised loss calculation total is **USD56m.**

| Summary | 2014-2023 |
|-------------------------------|-----------|
| Loss (USD '000) | 39,284 |
| Loss with interest (USD '000) | 55,904 |

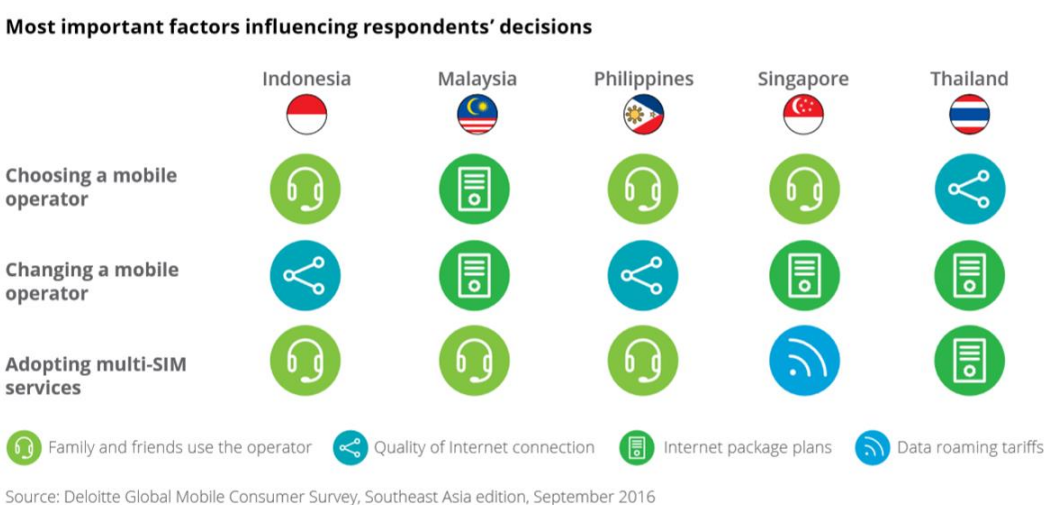


| | |
|---|----------|
| Assumptions | |
| Affected subscribers | |
| RTWP multiple | 2 |
| Proportion of subscribers | |
| % of 2G to 3G TML subscribers | 50% |
| ARPU | |
| Difference in 3G and 4G ARPU | 33% |
| TML 2G starting monthly ARPU | 2,250 |
| Split of 3G revenue between TML and OML | 50% |
| OPEX components | |
| Sales and distribution cost variability | 100% |
| Manpower cost as % of revenue | 8% |
| Advertising cost as % of revenue | 4% |
| Regulatory cost as % of revenue | 3% |
| Future loss | |
| | Yes |
| Interest and discounting | |
| Valuation date | 1/1/2019 |
| Interest rate | 14.5% |
| Mid year | Yes |
| Proportion due to interference: | 72.5% |

See next slide for explanation of this assumptions

Appendix 3 - Existing subscriber loss: apportionment of loss to interference factor analysis

- In determining the level of subscriber loss which can be attributed to the effects of interference we need to understand customer behaviour regarding mobile network choice and usage.
- Customer choice
 - Data from Deloitte's ASEAN mobile survey shows that the most important factors affecting subscribers changing a mobile operators are quality of service and pricing. As pricing is the same in Y&M between OML and TML the applicable factor explaining any usage differential is the quality of service.
 - In addition, the most important factor affecting subscribers adopting multi SIM services are "family and friends".
- Multi SIM usage
 - In the GSMA Intelligence report "Variable network quality a key driver of multi-SIM ownership" 10 January 2017, data shows that variable network quality is the second biggest driver of multi SIM ownership, after separate SIMs for personal and business use. The higher the perceived network quality in a country, the less likely consumers are to own dual SIM handsets and switch between different operators for better network coverage. In developing markets in particular, coverage and network quality remain key levers in operators' customer retention strategies and competitive positioning.
 - 15% of multi-SIM users in developed countries claimed they require multiple SIMs for travelling, both within their home market and abroad, because coverage varies by operator.
 - The GSMA survey showed a strong correlation between ownership of dual-SIM handsets, ownership of multiple SIM cards for coverage reasons, and a higher average number of SIMs per subscriber. Consumers are more likely to own multiple SIMs from different operators and use dual-SIM handsets in those markets where network quality is perceived as poor and few if any operators provide nationwide coverage.
- Conclusion:
 - Poor network quality in the area is a decisive factor in use of dual-SIM handsets. We therefore assume a range of 72.5% of any usage differential between OML and TML is attributed to interference (being the key determinant of relative network quality compared to competitors), with the balance attributed to second SIM factors of "family and friends".



| Factor | Impact range | Comment |
|-------------------------------------|--------------|------------------------|
| Family and friends use the operator | 27.5% | Second SIM |
| Quality of connection comprising: | | |
| a) Coverage | 0% | No differential in Y&M |
| b) Capacity | 0% | No differential in Y&M |
| c) Quality of service | 72.5% | Interference issues |
| Package plans | 0% | No differential in Y&M |
| Distribution | 0% | No differential in Y&M |
| Branding | 0% | Already a customer |
| Total | 100% | Impact on Usage |

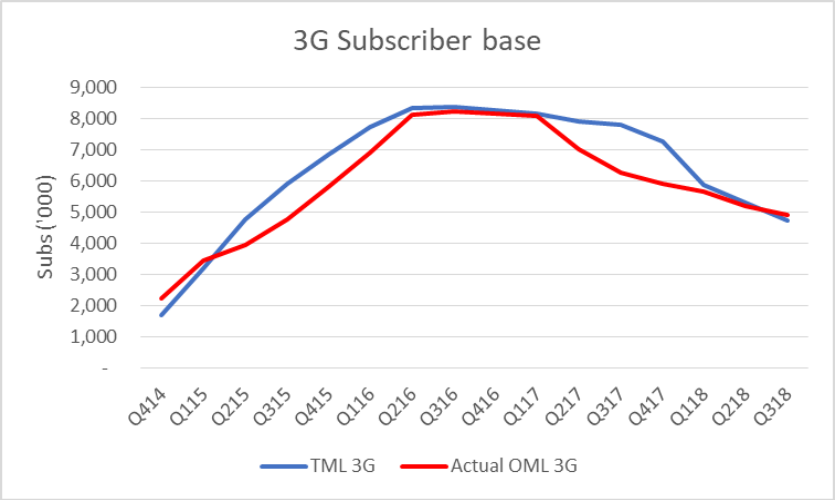
Source: Deloitte's, GSMA, company data

Appendix 4 - Lost profits from potential subscribers – market share vs TML

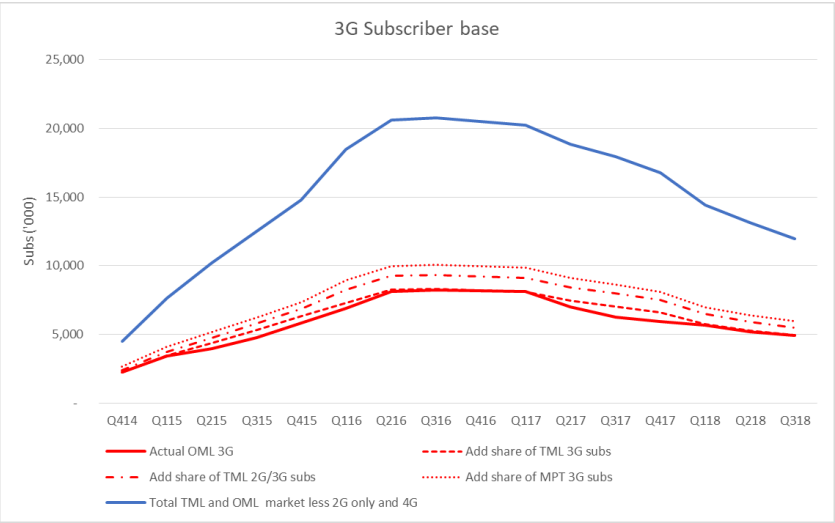
- Ooredoo has periodically lagged behind TML in terms of market share. This is partially attributed to interference, the assertion, as before, is based on the low switching costs and similar pricing and coverage between telecom operators. This means that over time the 3G share of users should be equally split between 3G operators.
- To calculate the loss of subscribers, we need to estimate the difference in OML’s 3G subscribers per quarter in the Normalized and Actual Positions.
- Losses from potential subscribers are based on a lower historic market share performance by OML, benchmarked by TML market share data.
- The table below shows the summary of lost profits from potential subscribers with a total of **US\$298m**.

| Summary | 2014-2023 |
|-------------------------------|-----------|
| Loss (USD '000) | 230,625 |
| Loss with interest (USD '000) | 297,612 |

Actual Ooredoo and Telenor 3G subscriber base

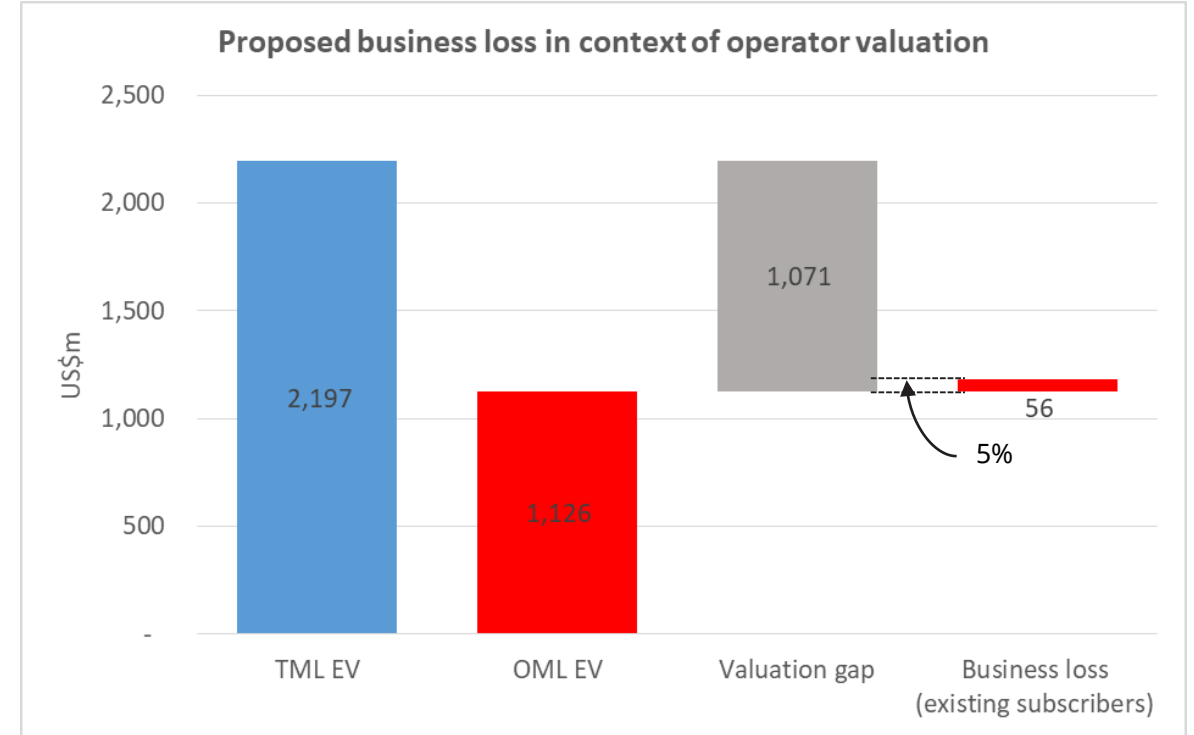


Potential Ooredoo 3G subscriber base



Appendix 5 - Methodology for proposed settlement figure in the context of value gap to competition

- To put the proposed settlement figure in the context of an overall valuation, we compare the settlement figure to the overall valuations of OML and TML.
- An EV/Sales multiple approach is used in estimating enterprise valuations (EV) of both companies. A comparable regional EV/Sales public trading multiple is applied to both OML and TML. Revenue is taken as the last 12 months of reported revenues (2Q18-1Q19) multiplied by 3.6x^{note}.
- The purpose of this valuation analysis is prepared on the basis of publicly available information solely for the purpose of establishing the relative valuation gap between the two companies.
- This results in an EV of US\$2.2bn for TML and US\$1.1bn for OML giving rise to a US\$1.1bn gap.
- Losses as a percentage of the valuation gap.
 - The proposed settlement figure of US\$175m consists of:
 1. Interference mitigation costs of USD119m. Note that as mitigation costs are actual costs spent, they are not relevant to the EV gap.
 2. Business loss due to interference (existing subscribers) of USD56m.
 - The ratio of the business loss of USD56m represents 5% of the valuation gap (i.e. 95% of the valuation gap with TML is related to all factors other than interference issues).



Note 1: Comparable benchmarks: ASEAN wireless operators. Enterprise valuation data from Morgan Stanley Research. Revenue data from BAML Global Wireless Matrix Report April 2019.



The End