A Post-Auction Review of 2.1 GHz Spectrum Licensing Obligations in Thailand

Settapong Malisuwan, Noppadol Tiamnara, and Nattakit Suriyakrai

***Abstract*—On December 7, 2012, the Thai telecommunications regulator issued spectrum and operational licenses type 3 for 2.1 GHz to three operators namely Advanced Wireless Network Company Limited (AWN), Real Future Company (RF) and dtac TriNet Company Limited (DTN). The current development of the telecommunications industry more than a year after the spectrum auction has shed a light on the suitability of license obligations imposed on license winners of 2.1 GHz. This research aims to analyze the practicality of license obligations such as network rollout and coverage obligation, service quality for voice and data and price reduction. The results have proven that the license obligations imposed for 2.1 GHz spectrum are pragmatic and achievable for operators in Thailand.**

***Index Terms*—Telecommunications, 3G, 2.1 GHz auction, license obligations, network rollout, coverage obligation, quality of service (QoS), price reduction.**

I. Introduction

Before 2012, Thailand was waiting for 2.1 GHz Spectrum Auction for more than a decade since the first 3G auction in United Kingdom. On 7 December 2012, the National Broadcasting and Telecommunications Commission (NBTC) issued spectrum licenses and operational licenses Type 3 for 2.1 GHz to three operators, namely, Advanced Wireless Network Company Limited (AWN), Real Future Company Limited (RF), and dtac TriNet Company Limited (DTN). Each company obtained a bandwidth of 2 ×15 MHz. To date, NBTC has allocated 56.9 million mobile numbers to these three operators (see Table I).

TABLE I: Total Allocated Mobile Numbers by Operators (NBTC, 2015)

Operator	Launch date	Allocated mobile numbers
AWN	7 May 2013	29.9 million
RF	8 May 2013	14.6 million
DTN	23 July 2013	12.4 million

Prior to the auction, Thailand has had to deal with mobile phone signal issues, insufficient data capacity and slow mobile internet access. So before 2.1 GHz was assigned, the quality of mobile communication services provided was insufficient in fulfilling the needs of the community in Thailand.

For the past two years after the 2012 auction, Thailand has had the opportunity to experience a more advanced and higher quality telecommunication service. A strong telecommunications system is critical especially for developing countries as it is considered as an important infrastructure for the economy by increasing business opportunities, country competitiveness and higher GDP.

The National Broadcasting and Telecommunications Commission (NBTC) has declared several critical license obligations that must be met by all 2.1 GHz license winners to ensure better network coverage, lesser mobile signal issues, higher call success rate, higher data speed, more affordable and retain competitive intensity in telecom industry.

The aim of this research is to analyze the suitability of license obligations set for 2.1 GHz spectrum license winners to achieve. This paper describes the outcome of the license obligations in order to judge whether the conditions are practical and whether the intended outcome was achieved. As license obligations are not a one size fit all and depends on each country's commitment in terms of universal access, service commitments and also obligations relating to promotion of competition [1]. It is therefore critical to conduct an analysis of suitability of the license obligation on network rollout and coverage, quality of service and price reduction.

A. GHz Spectrum Auction Regulations

The National Broadcasting and Telecommunications Commission (NBTC), telecommunication regulator, had declared a set of license obligations that 2.1 GHz license winners must comply with which are as follows:

1) **Network Rollout Obligations:** NBTC has set roll out obligation conditions for 2.1 GHz to ensure high coverage and maximum population access to mobile services. Rollout obligation conditions requires winners of 10 MHz or more to deploy network such that there is network coverage of every province and a population of not less than 50 percent within two years and 80 percent within four years with effect from the day the license for 2.1 GHz spectrum was awarded.
2) **Quality of Service (QoS)**: NBTC regulations for Quality of Service on voice require operators to achieve call setup success rate higher than 90%. Further, to manage mobile data service quality, NBTC requires operators to have data speed higher than 345 Kbps.
3) **Price Reduction Obligation**: To ensure fair and affordable pricing, operators are required to comply with NBTC regulation on decreasing their prices on voice and non-voice services by 15% in comparison to average price from 7th December 2012.

B. Number of Mobile Subscriptions in 2.1 GHz

Currently the number of mobile subscriptions in 2.1 GHz networks is about 60 million and the number has been

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continuously rising. One year after the second quarter of 2013, 55.6 million subscriptions (1,410%) were added. The number grew by 15.5 million (35%) in the first quarter of 2014 [2], of which 90% remain on prepaid.

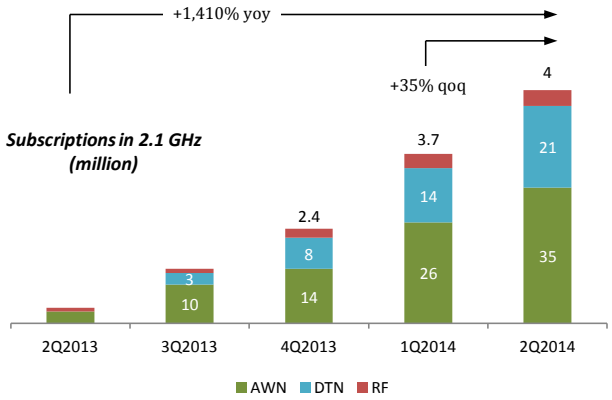


Fig. 1. Subscriptions [3].

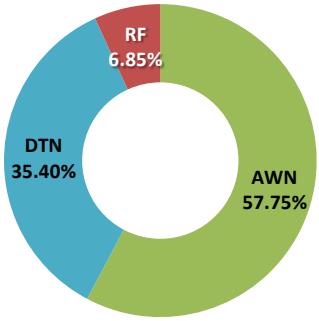


Fig. 2. Market share of 2.1 GHz in 2Q 2014 [3].

The growth of subscriptions during the above period is significantly contributed by the newly issued SIMs, which make up more than half of the total numbers. These new SIMs were acquired not only by first time users but also by the incumbents' 2G users, who prefer to have a new number for 3G services. The reason for soaring number of new 3G SIM numbers is mainly because all three operators have been offering better new number promotion packages for 3G services.

According to the existing regulation, the canceled 2G numbers will be barred for 180 days from porting among the operators, resulting in the rise of barred numbers during the same period.

TABLE II: SHARE OF SUBSCRIPTIONS

2Q2014	Active subscriptions (million)	Share of subscriptions		
		New SIMs	Internal porting (1)	External porting (2)
AWN	34.4	55.11%	44.43%	0.46%
RF	4.1	83.03%	16.54%	0.43%
DTN	21.1	41.45%	58.14%	0.41%
Total	59.6	53.26%	46.30%	0.44%

(1) Transfer of existing subscribers from the mother company to the subsidiary
(2) Transfer of existing subscribers among different operators

Mobile Number Portability (MNP) serves as an important platform to migrate existing subscribers from 2G to 3G on 2.1 GHz. As shown in the Table II, 46.30% of the total subscriptions come from porting incumbent subscribers from the mother companies to corresponding subsidiaries. Among the three licensees, DTN has the highest ratio of internal porting (58.14%) followed by AWN (44.43%) and RF (16.54%). External porting occupies a mere 3% of the total ported subscriptions.

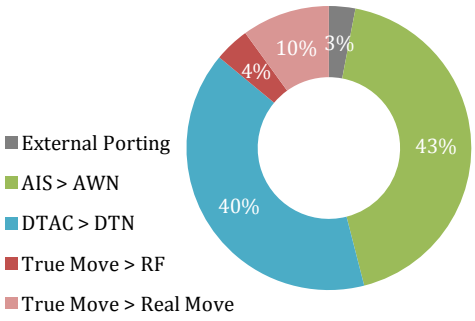


Fig. 3. Distribution MNP since Launch.

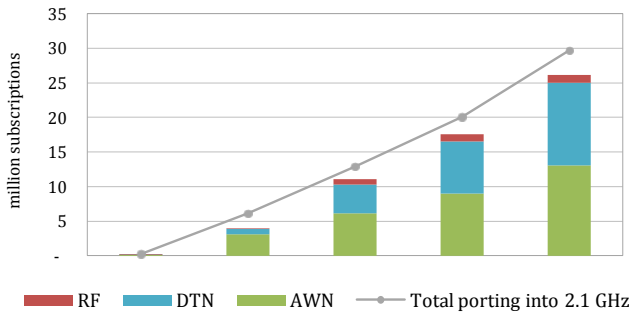


Fig. 4. Number of subscriptions ported into 2.1 GHz.

The number of mobile subscriptions in Thailand has now reached around 101 million. The subscriptions in 3G 2.1 GHz technology stand at 60 million while the remaining 41 million belong to other technologies. As recently as in 2012, other technologies used to hold 85 million subscriptions which then significantly declined by more than 50% after 3G penetration. During the same period overall mobile subscriptions has increased about 16 million (19%), partly contributed by the popularity of data services for the mainstream users. With the market flushed with a plethora of smart devices, more and more users are now accustomed to holding multiple subscriptions.

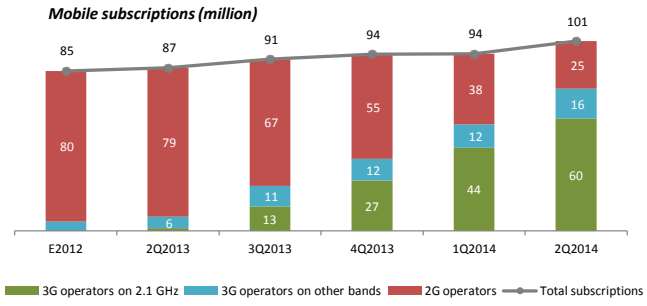


Fig. 5. Mobile subscriptions in millions 3G, 2G and total subscriptions [3].

In terms of **subscription market share**, AIS/AWN hold the largest portion at 47.8% (≈46.7 million), followed by DTAC/DTN at 28.22% (≈28.3 million) and TRUE/RF at 23.39% (≈23.4 million)[4]. The introduction of 2.1 GHz does not seem to have any significant impact on their market shares since it has remained at similar levels pre 2.1 GHz auction. The same ranking is also seen for 2.1 GHz

subscriptions, with 57.75% by AWN, 35.40% by DTN and 6.85% by RF.

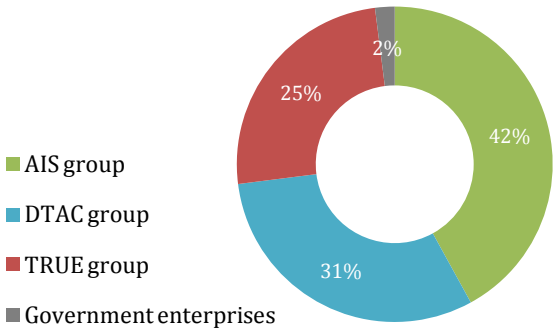


Fig. 6. Subscription market share – Y2012 [2], [5].

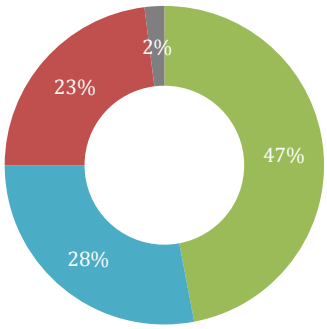
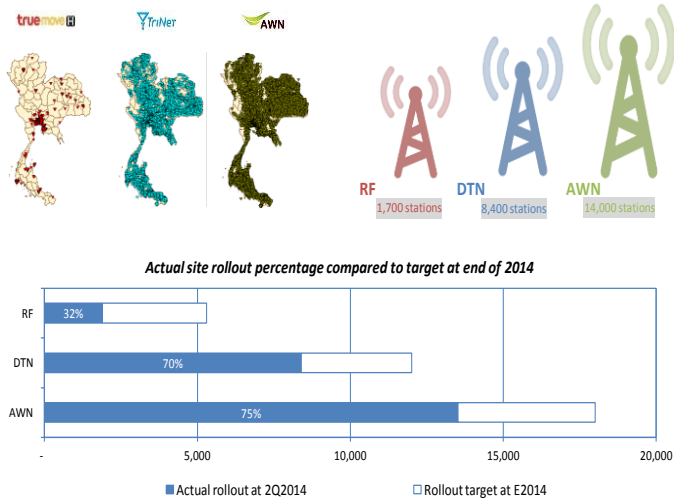


Fig. 7. Subscription market share – Y2014 [5].



Note: The number of base stations above only includes the ones on 2.1 GHz and excludes 3G base stations on other frequency bands.

Fig. 8. No. of base stations (2014) [6].

II. Network Rollout and Coverage Obligation

Since network rollout and coverage obligation regulation requires **minimum of 50% population coverage within two years after receiving the licenses**, all three operators have been continually installing new base stations to expand their coverage. By the second quarter of 2014, the total number of base stations across the country has reached an impressive level at 24,100 base stations. Again, AWN has been leading the pack by rolling out approximately 14,000 base stations, followed by DTN with about 8,400 and RF with around 1,700. RF is ready to bring in additional 1,000 base stations upon approval from NBTC. The current target is to install 18,000, 11,700 and 5,300 base stations by AWN, DTN and RF, respectively, by the end of 2014. By December 2014, two years after 2.1 GHz spectrum auction AWN had a 2.1 GHz network population coverage of 96.88%, DTN 90.86% and RF 58.70 %. Therefore, all operators have complied with NBTC regulation and have achieved a minimum of 50% or more population coverage within two years after receiving the licenses.

III. Mobile Service Quality

Voice call setup success rate and FTP download speed are the two main yardsticks that are used to measure quality of service (QoS). Since the first launch, all three operators have achieved call setup success rate higher than 90% as required by NTC regulation on the standard and quality of telecommunication services (voice). In the second quarter of 2014, all-time highest call setup success rate was recorded at 100% by AWN and RF, and at 99.58% by DTN. All operators also achieved high data speeds consistently when NBTC tested it in Bangkok around Central Rama 9, using 15 MB data (3 sessions each with 5 MB) as a test sample. The average data speed during the test was always above 345 kbps as required by NBTC regulation on mobile data service quality. Currently the average data speed of every operator stands around 4,000 – 5,000 kbps (see Table III).

TABLE III: Voice Call Success Rate [6]

	Voice call success rate				
Operator	2Q2013	3Q2013	4Q2013	1Q2014	2Q2014
AWN	99.66%	99.97%	98.46%	99.75%	100.00%
RF	99.63%	99.97%	97.92%	100.00%	100.00%
DTN	-	-	99.53%	99.21%	99.58%

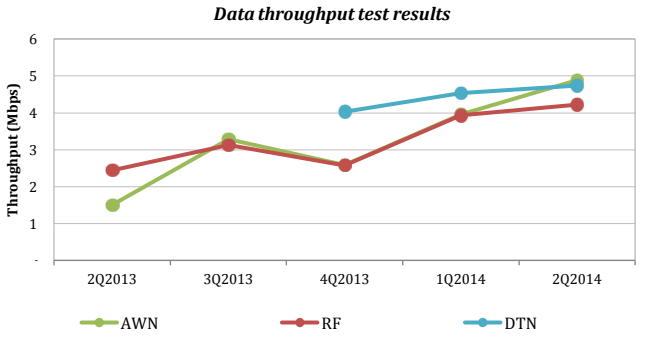


Fig. 9. Data throughput test results.

IV. Mobile Service Price

All 2.1 GHz licensees are required to offer voice and data services at a price level that is at least 15% lower than the reference price on the day of license issuance (7 December 2012). The procedures to check service price reduction as per NBTC requirement are summarized as follows:

Step 1: Calculate average service price on 7 December 2012 by taking into account all 541 promotions offered at the time from all twelve operators as shown in Table IV.

Step 2: Calculate the target service price after 15% reduction as shown in Table IV

TABLE IV: AVERAGE TELECOM PRICE OF ALL SERVICES

	Voice (Baht/min)	SMS (Baht/SMS)	MMS (baht/MMS)	Internet (Baht/MB)
Average service price on 7 December 2012	0.97	1.56	3.90	0.33
Target service price after 15% reduction	0.82	1.33	3.32	0.28

Step 3: Calculate the service unit price of all promotions as shown in the examples below (Table V and Table VI):

Example: Pro 1

500 Baht for 400 voice minutes, 100 SMS, 100 MMS, and 750 MB of data

TABLE V: PACKAGE PRICE [6]

	Package price (Baht)	Benefits	Service price split (Baht)	Service unit price (Baht)
Voice	500	400 min	315	0.78
SMS		100 SMS	10	0.10
MMS		100 MMS	10	0.10
Internet		750 MB	165	0.22

Example: Pro 2

TABLE VI: PREPAID PRICE [6]

Prepaid	Voice (Baht/min)	SMS (Baht/min)	MMS (Baht/MMS)	Internet (Baht/MB)
Price	0.75	1	3	0.20

Note: Each licensee is obliged to split the total package into individual service price to be examined by NBTC. If the package price is not clearly broken down, NBTC will use the revenue ratio of each service to calculate its corresponding price from the total amount.

Step 4: Calculate the average service price in each month from all promotions (Pro 1 – Pro n) as shown in the diagram below. Then, compare the average price in each month with the target price.

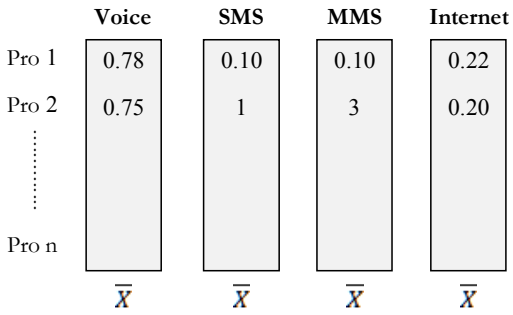


Fig. 10. Average price of all telecom services [6].

Note:

1) The information used to calculate the average service price comes from the structure and service price report submitted by the operators to NBTC on a monthly basis. On average, AWN offers more than 400 promotions a month, while DTN and RF each introduce around 100 promotions.
2) The average service price calculation on postpaid service assumes that subscribers choose the right promotion so that there is no unused quota left at the end of the month. For prepaid subscribers, the calculation takes the average of the first four voice minutes.
3) In the process of average service price calculation, a weighting factor of 80% is applied for the main promotion and 20% for the supplement since some subscribers may choose the supplementary promotion on top of the main one.
4) The calculation is carried out for two distinct scenarios. In case an existing 2G promotion is carried over to 3G 2.1 GHz, the price has to be reduced 15% from the previous level. All new promotions however are benchmarked against the reference level on 7 December 2012.

Throughout 2013 and 2014, NBTC has been tracking 2.1 GHz service prices on a monthly basis to ensure the above licensing condition is honored and the outcomes from the commission meetings are properly followed. The average price calculation protocols are released on NBTC website to educate both consumers and operators. The operators initially misunderstood average price calculation protocol of NBTC and ended up having pricing schemes that did not meet the regulation. In order to improve the situation, NBTC educated the operators on a number of occasions until their promotions eventually fell in line with the regulation and the licensing condition. In June 2014, average voice service costs about 0.53 – 0.75 Baht per minute which is about 22% - 46% lower than an earlier average price of 0.97 Baht per minute on 7 December 2012. Following the same trend, data service price has fallen to 0.25 – 0.27 Baht per MB which is about 19 - 23% lower comparing with 0.33 Baht per MB on 7 December 2012.

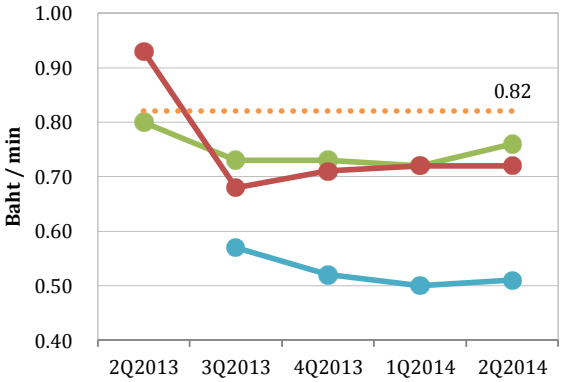


Fig. 11. Average unit price for voice [6].

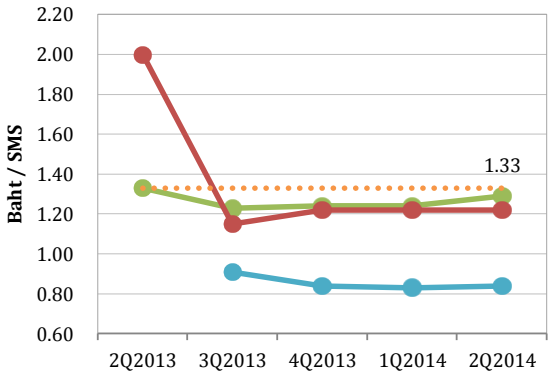


Fig. 12. Average unit price for SMS [6].

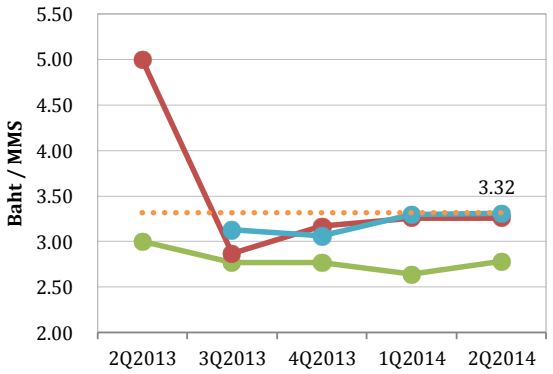


Fig. 13. Average unit price for MMS [6].

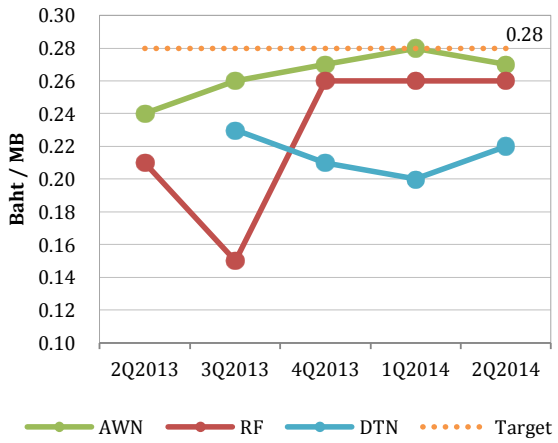


Fig. 14. Average Unit Price for Internet [6]

June 2014:

Average unit price has fallen below the 15% reduction target as shown in the Table VIII.

TABLE VII: PROMOTIONS

Average price	Number of promotions		Voice (Baht/min)	SMS (Baht/SMS)	MMS (Baht/MMS)	Data (Baht/MB)
	Existing	New				
AWN	6	410	0.75 (-22%)	1.33 (-15%)	2.85 (-27%)	0.27 (-19%)
RF	3	147	0.72 (-26%)	1.22 (-22%)	3.26 (-16%)	0.26 (-21%)
DTN	3	105	0.53 (-46%)	0.84 (-46%)	3.32 (-15%)	0.21 (-36%)

V. CONCLUSION

While the 2.1 GHz spectrum auction is a leading revolutionary change for Thai telecommunications because it transitioned from concessionaire to licensing regime, there are license obligations by NBTC that had to be met post auction.

Since the 2012 spectrum auction, the mobile subscription market share between operators have not had a significant change resulting in the same competitive structure. AIS/AWN still holds the largest portion at 47%, DTAC/DTN 28%, and True/RF 23% . In other 3G auctions, in UK for instance, the competitive dynamics was changed due to impact from high cost of investment from the auction and network deployment post auction, resulting in British Telecom (BT) making an exit. Hence, for Thailand that has a oligopolistic structure, retaining the current competitive dynamics which features high competition intensity will have a more positive impact on telecom industry in Thailand.

Firstly, by December 2014, more than a year after 2.1 GHz spectrum auction AWN had a 2.1 GHz network population coverage of 96.88%, DTN 90.86% and RF 58.70 %. Therefore all operators complied with network rollout obligation set by NBTC. Secondly, in terms of quality of service, all three operators have achieved higher voice call success rate than 90% as required by NBTC. NBTC has also conducted data speeds test to ensure that data speed is above 345 kpbs. All operators passed the test with an average data speed at 4,000 – 5,000 kbps. Therefore, operators are going beyond what is required by NBTC in data speed to retain competitive position amidst high competitive intensity to capture the highest market share. However, seeing as operators have exceeded our regulatory requirement for data quality of service, NBTC is recommended to increase data speed in license conditions for future auctions to meet consumers' demand and also by taking technological advancements into account. Lastly, to bridge the digital divide between higher income and lower income consumers, operators were required to lower telecom prices to make both voice and data services more affordable. Operators have followed NBTC regulation and have decreased their prices for voice, sms, mms and internet by more than 15%.

In conclusion, this research has proven that the 2.1 GHz spectrum auction license obligations are pragmatic for Thailand and have been followed by all 2.1 GHz license winners. As license conditions are not a one size fits all, it was pertinent to conduct this research to provide a basis for licence obligations for future auctions.

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