SOCIAL AND ECONOMIC BENEFITS OF USING THE LOWER PORTION OF THE UHF BAND FOR IMT

Executive Summary

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THE LOWER PART OF THE UHF (470-698 MHz) BAND REPRESENTS A KEY RESOURCE TO BE CONSIDERED AS THE "SECOND DIGITAL DIVIDEND"

- While Latin America's approach to spectrum licensing has significantly changed in the last decade, towards the end of 2013 there was only 270 MHz being used per country, on average, for mobile telecommunications
- This amount of spectrum is far from the 1340 to 1960 MHz that has been estimated by the International Telecommunication Union for these services by 2020
- Today, most countries have started the process to assign the 700 MHz band for the deployment of IMT services
- Nevertheless, the 90 MHz in the 700 MHz band will probably not be enough to support future growth of mobile broadband
- Even though other bands are still partially available (mostly, AWS and 2.6 GHz), Latin America will need to allocate, identify, and later assign, further spectrum bands for IMT services
- There are several candidate bands (e.g., L band, 2.7 GHz, 3.4 GHz), but the sub-700 MHz spectrum is key for coverage of rural areas

THE LOWER PART OF THE UHF BAND – FROM 470 TO 698 MHz – IS TODAY MOSTLY ALLOCATED ON A PRIMARY BASIS, TO BROADCASTING SERVICES IN LATIN AMERICA

LATIN AMERICA: CURRENT ALLOCATION OF THE 470-698 MHZ BAND

Band	Brazil	Chile	Colombia	Mexico	Peru
470-512	BROADCASTING	MOBILE, FIXED	BROADCASTING	BROADCASTING FIXED MOBILE	BROADCASTING
512-608	BROADCASTING	BROADCASTIING, Fixed	BROADCASTING	BROADCASTING FIXED MOBILE	BROADCASTING
608-614	RADIO ASTRONOMY	RADIO ASTRONOMY Mobile satellite system except aeronautical mobile telecommunication service via satellite	RADIO ASTRONOMY Mobile satellite system except aeronautical mobile telecommunication service via satellite	RADIO ASTRONOMY Mobile satellite system except aeronautical mobile telecommunication service via satellite	RADIO ASTRONOMY Mobile satellite system except aeronautical mobile telecommunication service via satellite
614-698	BROADCASTING FIXED	BROADCASTING Fixed /FIXED/*	BROADCASTING	BROADCASTING FIXED MOBILE	BROADCASTING

Note: Upper-case words refer to primary services; lower-case refers to secondary services.

- Denotes a service which is permitted on a primary basis, except during the preparation of frequency plans, where primary services receive priority

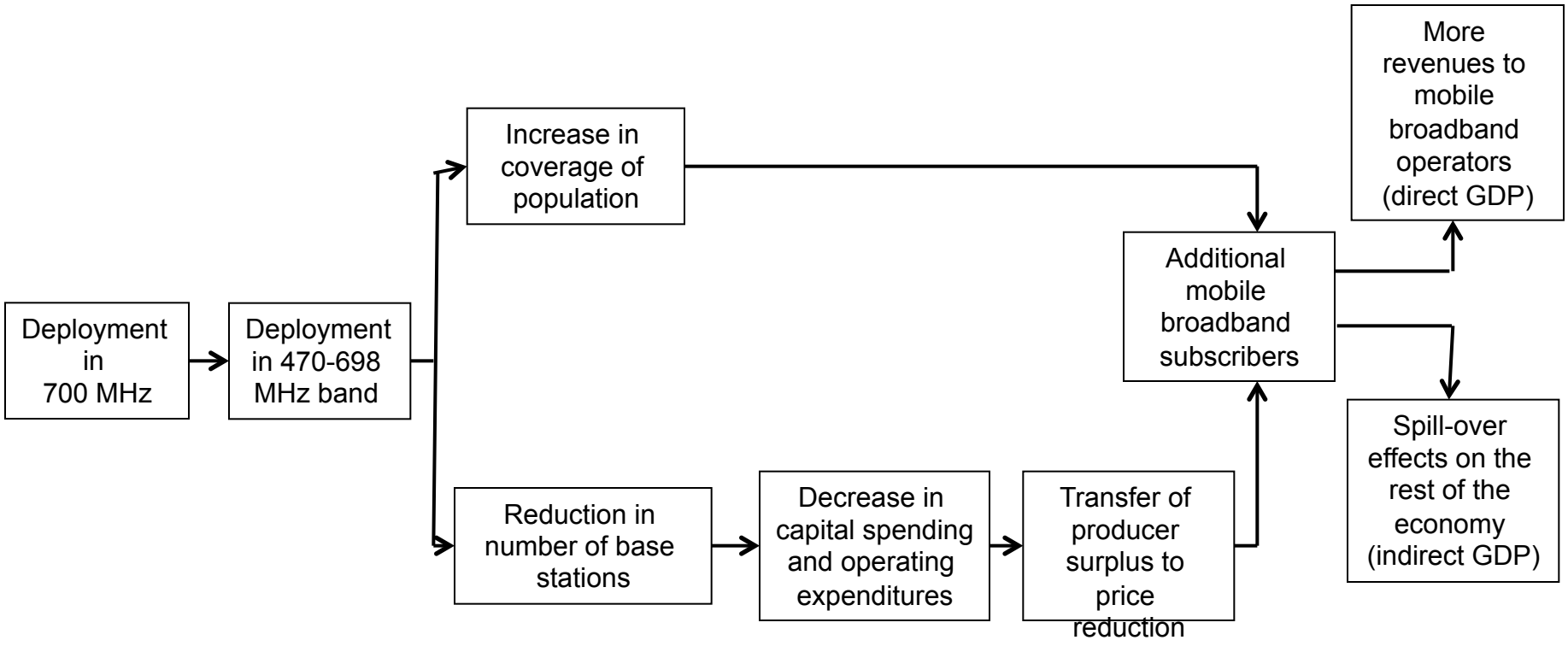
Source: Compiled by Telecom Advisory Services

WE ASSESSED THE SOCIAL AND ECONOMIC BENEFITS OF ALLOCATING THE BAND TO IMT ON A PRIMARY BASIS

- Incremental contribution to GDP (direct, in terms of additional mobile broadband revenues, and indirect, in terms of economic spill-overs)
- Job creation (direct employment - within the industry- and indirect – from suppliers to the mobile broadband industry)
- Additional tax contribution of the wireless sector to the treasuries of Latin American countries
- Increase in consumer surplus resulting from price declines

THE IMPACT ON THE GDP RESULTING FROM COVERAGE INCREASE USING FIRST THE 700 MHz BAND AND SECONDLY THE 470-698 MHz BAND WAS ESTIMATED

METHODOLOGY FOR CALCULATING GDP IMPACT OF ALLOCATING THE 470-698 MHZ BAND TO IMT



Source: Telecom Advisory Services

THE INCREASE IN COVERAGE BENEFITS PRIMARILY RURAL AREAS, WITH A NET INCREASE IN SUBSCRIBERS IN THESE AREAS

LATIN AMERICA: CURRENT AND FUTURE MOBILE BROADBAND COVERAGE (% of population)

Country	3G services	Total coverage due to 700 MHz	Total coverage due to 700 MHz and 470-698 MHz bands
Argentina	89.00 %	93.60 %	94.40 %
Bolivia	90.00 %	90.00 %	90.00 %
Brazil	91.30 %	94.28 %	95.70 %
Chile	100.00 %	100.00 %	100.00 %
Colombia	95.00 %	95.38 %	96.53 %
Costa Rica	93.25 %	93.25 %	93.25 %
Ecuador	87.47 %	87.47 %	89.60 %
Mexico	91.00 %	91.00 %	93.07 %
Paraguay	70.00 %	83.97 %	87.96 %
Peru	79.40 %	88.32 %	91.22 %
Uruguay	81.00 %	85.48 %	86.26 %
Venezuela	96.06 %	97.40 %	98.05 %

(*) Note: For purposes of estimation, the reach of 470-698 MHz band is 20% superior to the 700 MHz band

Source: Telecom Advisory Services analysis

MORE IMPORTANTLY, ALLOCATING THE SUB-700 MHz BAND TO IMT WOULD DECREASE THE NUMBER OF BASE STATIONS AS A RESULT OF BETTER SIGNAL PROPAGATION

METHODOLOGY FOR CALCULATING THE REDUCTION IN BASE STATIONS

Base stations required under 470-698 MHz allocation to IMT	=	Base stations required under 700 MHz allocation to IMT	–	Urban base stations required under 470-698 MHz allocation to IMT	+	Rural base stations required under 470-698 MHz allocation to IMT

Country	Current number of base stations	Reduction in the number of base stations under 470-698 MHz
Argentina	15,731	881
Brazil	73,111	3,977
Chile	4,892	271
Colombia	14,019	749
Mexico	37,943	1,998
Peru	9,335	513
Rest Latam	41,931	2,269
TOTAL	196,962	10,659

- Reducation in base stations: 5%
- NPV of CAPEX: US$897 million

Source: Telecom Advisory Services analysis

THIS REDUCTION WILL ALLOW MOBILE OPERATORS TO REDUCE THEIR PRICES BY AROUND 0.95% (IN ADDITION TO THE 10% RESULTING FROM THE UTILIZATION OF THE 700 MHz)

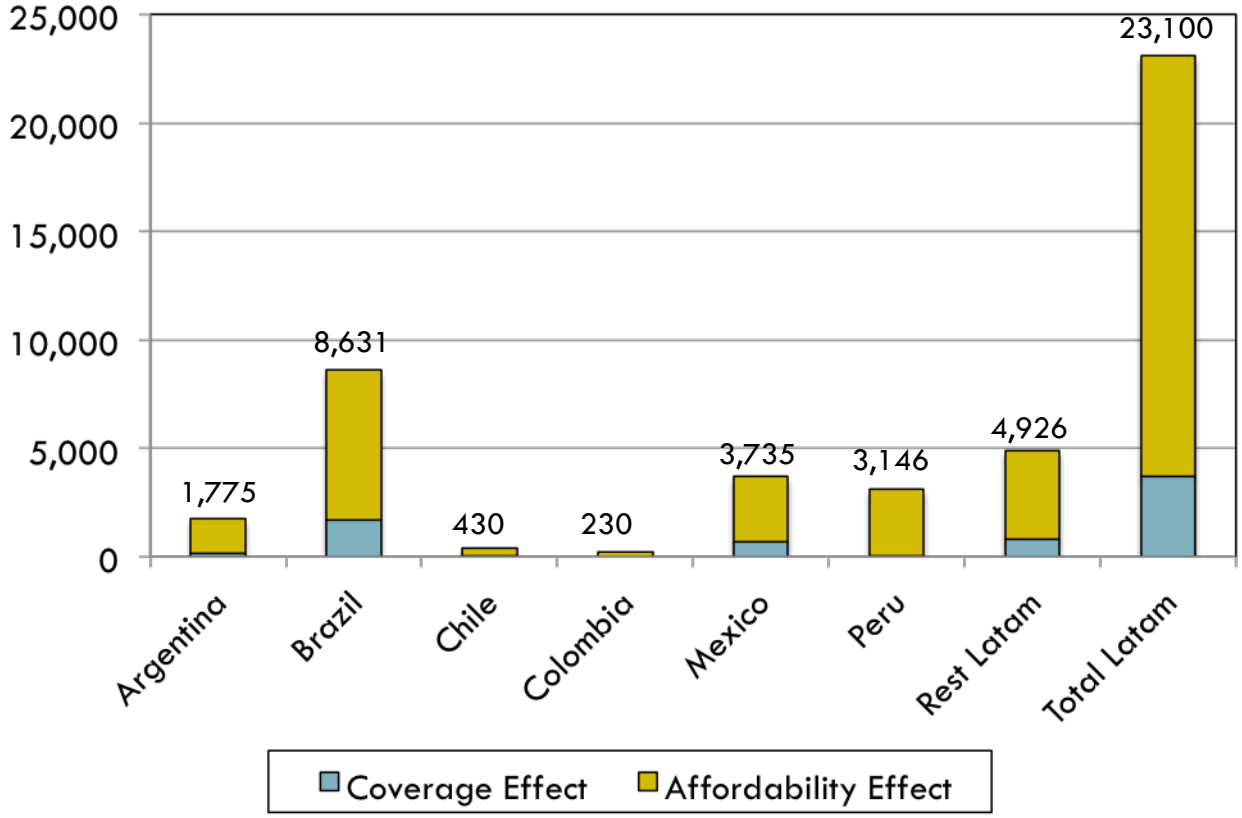
LATIN AMERICA: CURRENTAND FUTURE MONTHLY PRICE OF 500 MB CAP MOBILE BROADBAND PLAN (IN US$)

Country	Price (as of January 2014)	Estimated price (with 700 MHz)	Estimated price (with 700 MHz and 470-698 MHz)
Argentina	11.02	9.92	9.81
Bolivia	7.09	6.38	6.31
Brazil	15.21	13.69	13.54
Chile	34.18	30.77	30.44
Colombia	13.86	12.47	12.34
Costa Rica	17.90	16.11	15.94
Dominican Rep.	19.66	17.70	17.51
Ecuador	16.79	15.11	14.95
El Salvador	32.50	29.25	28.94
Guatemala	12.77	11.49	11.37
Honduras	15.38	13.84	13.70
Mexico	15.11	13.60	13.46
Nicaragua	12.20	10.98	10.86
Panama	9.99	8.99	8.90
Paraguay	7.91	7.12	7.04
Peru	15.17	13.65	13.51
Uruguay	6.58	5.92	5.86
Venezuela	27.98	25.18	24.91

Source: Telecom Advisory Services analysis

ENHANCED COVERAGE AND BETTER NETWORK ECONOMICS RESULTING FROM THE ALLOCATION OF THE SUB-700 MHz BAND WOULD YIELD 23 MILLION ADDITIONAL SUBSCRIBERS

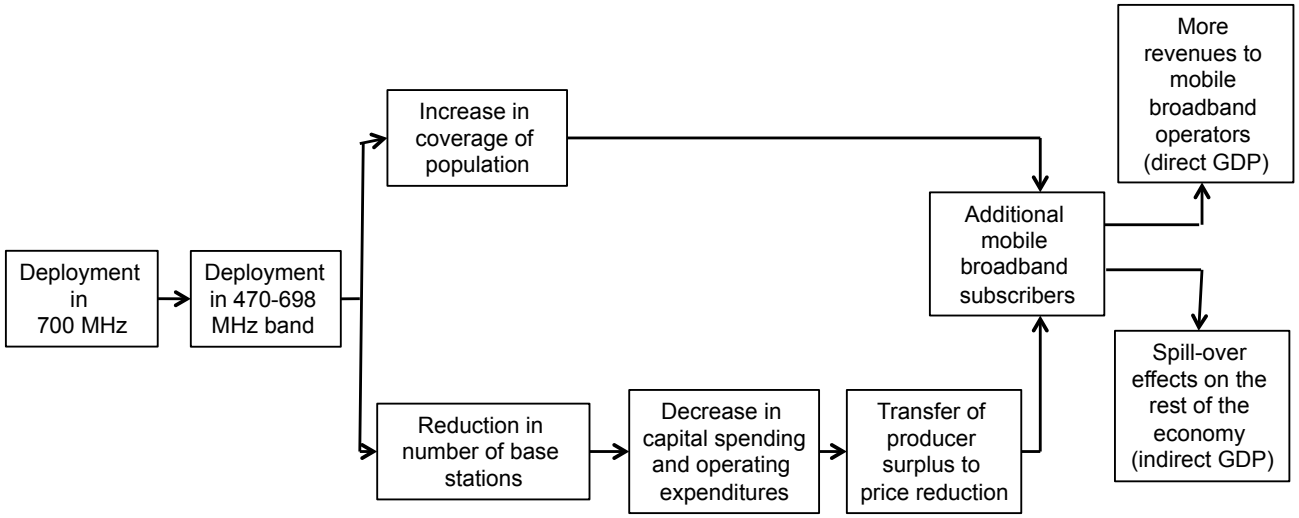
LATIN AMERICA: NEW MOBILE BROADBAND SUBSCRIBERS RESULTING FROM 470-698 MHZ BAND INCREASED COVERAGE AND REDUCED INFRASTRUCTURE ('000)



Source: Telecom Advisory Services analysis

AS A RESULT, THE ALLOCATION OF SUB-700 MHz BAND TO IMT WILL GENERATE A DIRECT AND INDIRECT CONTRIBUTION TO THE LATIN AMERICAN GDP REACHING US$ 50 BILLION

LATIN AMERICA: OVERALL IMPACT ON GDP OF ALLOCATING THE 470-698 MHZ BAND TO IMT



NPV (Additional subscribers * most economical broadband plan) = US$ 12,360 million

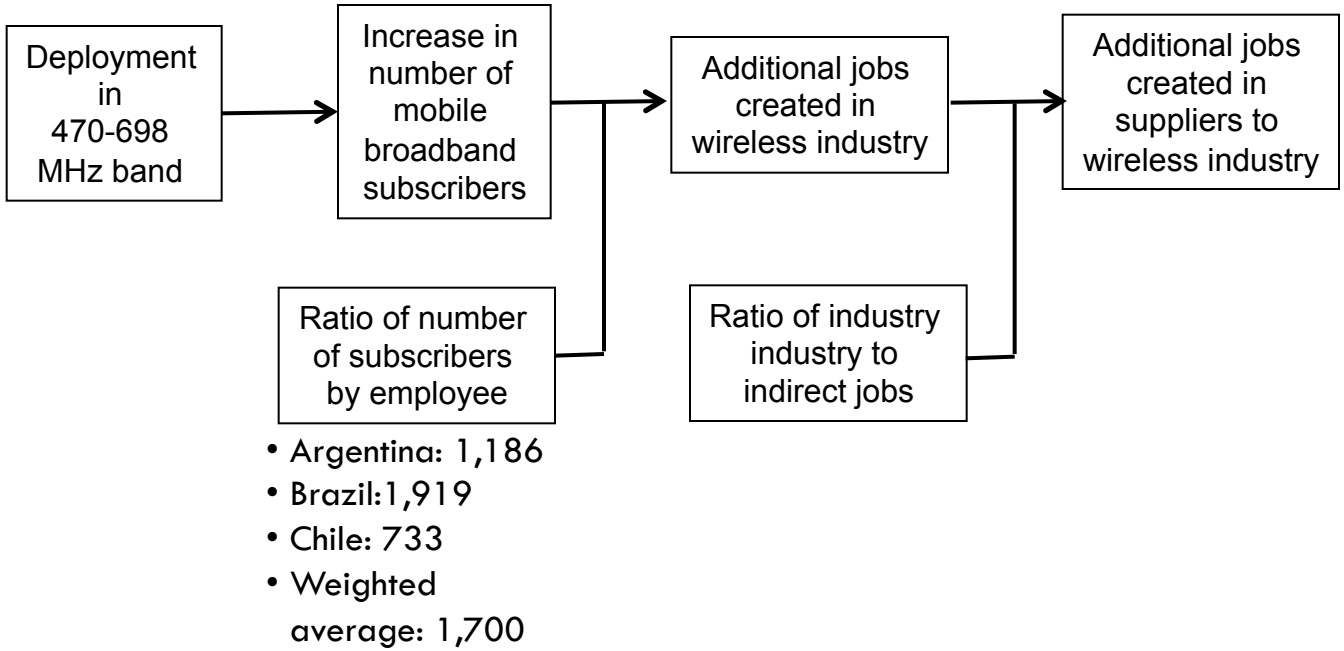
NPV (Economic impact on GDP of additional broaband penetration *) = US$ 37,764 million

(*) Katz and Koutroumpis (2013) estimated for Senegal that every 1% increase in mobile broadband penetration yields 0.022% growth in GDP. A similar coefficient was estimated for Australia (Center for International Economics, 2014), where mobile broadband generated a 0.019% growth in GDP for a 1% increase in mobile broadband penetration.

Source: Telecom Advisory Services analysis

IN ADDITION, THE INCREASE IN THE NUMBER OF SUBSCRIBERS WILL TRIGGER THE CREATION OF NEW DIRECT AND INDIRECT JOBS PER YEAR

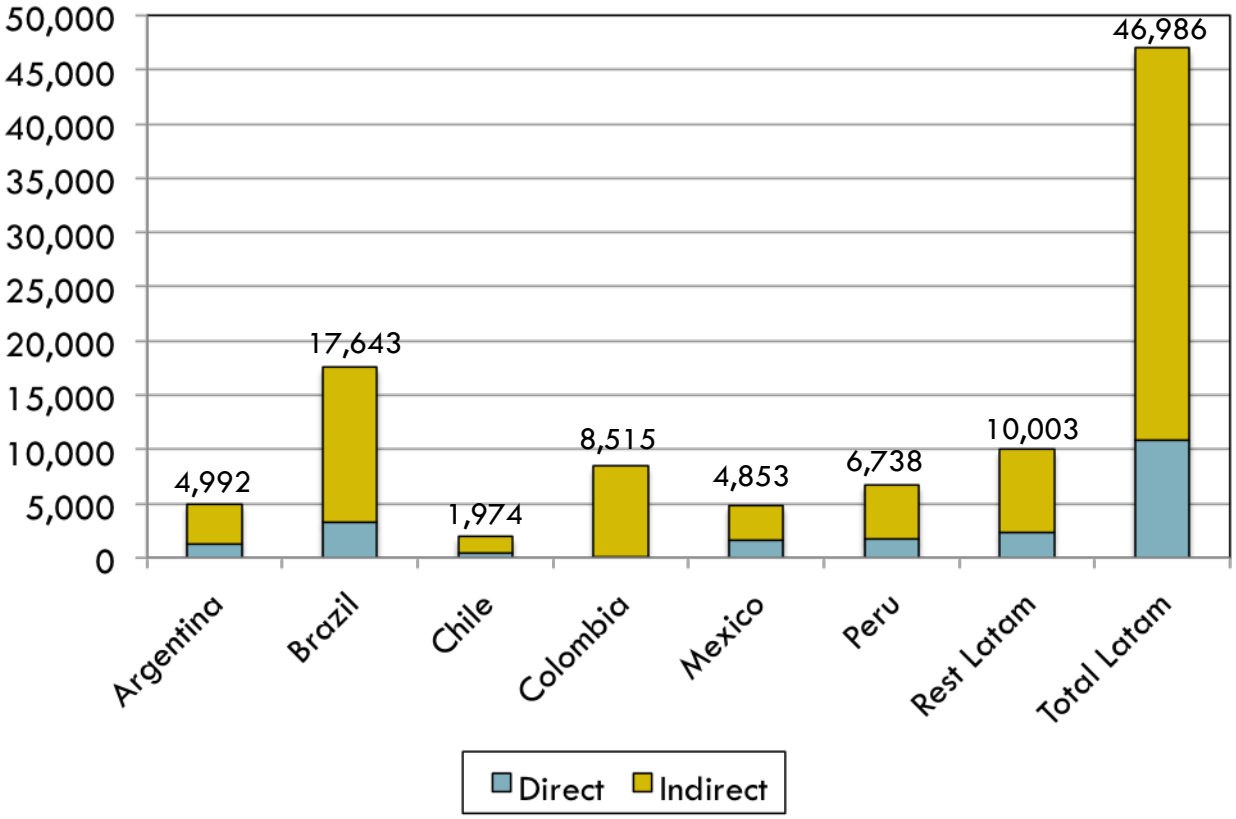
METHODOLOGY FOR CALCULATING JOB CREATION IMPACT OF ALLOCATING THE 470-698 MHZ BAND TO IMT



Source: Telecom Advisory Services

THE NUMBER OF DIRECT AND INDIRECT JOBS AS A RESULT OF ALLOCATING THE 470-698 MHz BAND WILL AMOUNT TO AN AVERAGE OF 47,000 PER YEAR

LATIN AMERICA: AVERAGE NEW JOBS PER YEAR RESULTING FROM ALLOCATING THE 470-698 MHZ BAND TO IMT ('000)



Source: Telecom Advisory Services analysis

THE INCREASE IN REVENUES TO BE GENERATED BY MOBILE BROADBAND SERVICE PROVIDERS WILL RESULT IN AN INCREASE IN TAX CONTRIBUTION EQUIVALENT AT US$ 2.8 BILLION

LATIN AMERICA: SALES TAX RATE AND CONTRIBUTION BY MOBILE BROADBAND SERVICE PROVIDERS AS A RESULT OF ALLOCATING THE 470-698 MHZ BAND TO IMT (in million US $)

Country	Sales Tax Rate	2015	2016	2017	2018	2019	2020	Net Present Value
Argentina	21,00 %	32	36	37	38	38	39	US$ 158
Brazil	27,50 %	229	273	280	286	292	298	US$ 1,189
Chile	19,00 %	17	21	22	23	24	24	US$ 94
Colombia	20,00 %	-	1	1	1	1	1	US$ 2
Mexico	16,00 %	64	71	73	74	75	76	US$ 312
Peru	20,00 %	95	98	99	99	100	100	US$ 428
Rest Latam	Varies	118	136	139	142	144	147	US$ 594
TOTAL		556	638	652	666	678	690	US$ 2,788

Source: Telecom Advisory Services analysis

FINALLY, AS MOBILE BROADBAND PRICES DECLINE AS A RESULT OF THE ALLOCATION OF SUB-700 MHz BAND, THAT RESULTS IN CONSUMER SURPLUS

- Consumer surplus (a metric not captured in GDP statistics) represents the difference between a consumers' willingness to pay (as a measure of value) and actual price
- The study of broadband consumer surplus needs to be based on an understanding of the value attributed to broadband by consumers (a metric usually captured through survey research)
- For this study, we relied on price declines to "trace out" the demand curve for broadband: as the real price falls, the demand for broadband rises
- This methodology assumes that constant/falling nominal prices explain growing use of households and presumes a stable demand
- It is somewhat conservative because it tends to ignore early adopters, which are less price sensitive and attribute enormous value (and therefore exhibit high willingness to pay) to broadband
- The methodology computes consumer surplus indexed to the starting year of the time series, by multiplying the number of subscribers by the price decline in real terms
- This estimate excludes all new subscribers gained as a result of extended coverage and those accessing the service for the first time as a result of lower costs

THE INCREASE IN CONSUMER SURPLUS AS A RESULT OF PRICE DECLINES WILL APPROXIMATE US$ 3.8 BILLION

LATIN AMERICA: CONSUMER SURPLUS FOR SUBSCRIBERS BENEFITTING FROM PRICE DECLINE RESULTING FROM THE ALLOCATION OF THE 470-698 MHZ BAND to IMT (IN US$ MILLION)

Country	2015	2016	2017	2018	2019	2020	Net present value
Argentina	32.8	40.6	47.9	54.5	60.8	66.7	211.9
Brazil	282.5	331.7	385.2	434.4	480.4	524.4	1,711.6
Chile	33.7	44.6	54.6	63.4	70.9	77.4	239.5
Colombia	20.0	28.0	37.9	47.0	55.6	63.8	172.4
Mexico	79.9	97.2	114.9	132.0	148.4	163.9	514.2
Peru	21.2	27.8	34.2	40.5	46.7	52.3	154.2
Rest Latam	127.1	154.2	182.5	208.8	233.5	256.5	812.4
TOTAL	597.2	724.1	857.2	980.6	1,096.7	1,204.9	3,816.3

Source: Telecom Advisory Services analysis

IN SUM, THE STUDY INDICATES SUBSTANTIAL BENEFITS TO BE GENERATED AS A RESULT OF USING THE 470-698 MHz BAND TO PROVIDE MOBILE BROADBAND SERVICES IN LATIN AMERICA

- An increase in broadband coverage resulting from increased availability of mobile broadband, a fundamental variable to ensure economic growth in Latin America
- More optimal deployment and operation of new networks, resulting in a reduction of capital investment of US $ 897 million compared to deployment of infrastructure in higher frequency bands, while achieving better coverage
- Direct (additional revenues to the industry) and indirect contribution (positive externalities) to GDP reaching US$ 49 billion
- Creation of more than 47,000 direct and indirect additional jobs
- Additional tax contribution in excess of US $ 2.8 billion
- A consumer surplus of US $3.816 billion

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