

# Macau

Pindar Wong

.mo

## Overview

Macau provides a unique and fascinating example of how partial telecommunications liberalisation is being used to encourage the development of ICTs in an economy that is classically served by a monopoly, given its small size.

Macau has only 436,700 people<sup>1</sup> living in a total area of only 25.8 square kilometres (about one-tenth the size of Washington DC), and yet in 2001 it managed to attract over ten million visitors and have a per capita GDP of US\$14,281!<sup>2</sup>

Most of these visitors came via neighbouring Hong Kong, both are Special Administrative Regions (SAR) of the People's Republic of China, and with which it has close economic and cultural ties. Hong Kong lies only 60 kilometres to the northeast, easily reachable by boat within an hour, and is Macau's largest trading partner. The local currency, the Macau pataca (MOP), is pegged to the Hong Kong dollar at 1.03 to 1 (i.e. US\$1 = MOP 8.03 ). The Hong Kong dollar is in free circulation in Macau.

In the 1970s Macau's economy was heavily based on the manufacturing and trading of textiles and garments, with a smaller emphasis on toys, plastic articles and electronics. Today, Macau's open, service-oriented economy is largely based on tourism and legalised gambling. Its ten casinos contribute around 64 percent of Macau government's revenue<sup>3</sup> and employ about 30 percent of the working population. The other main pillars of the economy are export-oriented processing, banking, insurance and real estate.

Where infrastructure is concerned, Macau is physically connected to the Sea-Me-We3 submarine cable system and via terrestrial optical fibre to the Zhuhai Special Economic Zone through Macau's Border Gate. Other terrestrial fibre optic links to China are being considered across the Lotus Bridge, which links Taipa Island to China. Voice traffic to Hong Kong is carried by two digital microwaves. Satellite antennae exist on the southern tip of Coloane Island and connect to Intelsat. So far, Macau does not have a public Internet exchange point, and no network time protocol (NTP) services are provided. It is understood that the Macau Observatory is considering providing NTP services in 2003.

## Content

There are two official languages in Macau (Chinese and Portuguese), with over 96 percent of the population speaking Chinese and 2 percent Portuguese. The Cantonese dialect is the most popular spoken language here, although Mandarin and Fujianese dialects are also common.<sup>4</sup> Macau faces similar issues as Hong Kong over Chinese language computing (see the Hong Kong chapter on HKSCS).

Although Teledifusao de Macau<sup>5</sup> provides free-to-air radio and television programmes in both Portuguese and Cantonese, Macau's close cultural ties with and physical proximity to Hong Kong has a detrimental affect on local content production. Hong Kong television and radio broadcasts, as well as Hong Kong newspapers and magazines, all compete with local content production. A study in December 2002 by the University of Macau indicated that Hong Kong content dominates, with local content being referred to primarily for local news.<sup>6</sup> It has even been argued that local students are more familiar with Hong Kong's history given that school textbooks come from Hong Kong.

Content related to Macau's tourism industry is particularly strong.

### Important local sources of content

The following are some topical and useful sources of Macau content (sites are bilingual in Chinese and Portuguese) unless otherwise noted:

#### Casa de Macau <<http://www.casademacau.org>>

Eurasians or "Macanese" are people born in Macau of mixed Portuguese-Chinese ancestry, and they have their own unique culture and cuisine. This website in English provides a community portal to the Macanese, many of whom have chosen to leave Macau.

#### CyberCTM <<http://www.cyberctm.com>>

Companhia de Telecomunicações de Macau (CTM) operates by far the largest ISP in narrowband, broadband and wireless.

**Dr Ho 888** <<http://www.drho888.com>>

This is the online casino of Dr Stanley Ho, Macau's casino tycoon and father of the gambling industry, which was previously monopolised by Sociedade de Turismo e Diversoes Macau.

**International Library of the University of Macau**

<<http://www.umac.mo/lib/LIB.html>>

Constructed in 1999, it is the largest library in Macau, with state-of-the-art facilities and free public Internet access. About 40 percent of its library material budget is allocated to the acquisition and servicing of electronic resources (commercial databases, e-books, e-journals, CD-ROM, videos and Web-based material). It is also a depositary library for more than ten international organisations (e.g. UN, EU, WTO, APEC, NATO).

**Macau Cable TV** <<http://www.macaucabletv.com>>

In 1999, Macau Cable TV was awarded a 15-year franchise to provide cable television services in Macau. In 2002, it offered around 40 channels of content, most of it from overseas.

**Macao Daily News** <<http://www.macaodaily.com>>

This is the largest-circulated daily newspaper in Macau (in Chinese only).

**Macau Productivity and Technology Transfer Centre (CPTTM)** <<http://www.cpttm.org.mo>>

Established as a non-profit organisation by the government and the private sector, CPTTM promotes higher productivity and stronger competitiveness of Macau firms by supporting their use of new information resources and methodologies.

**Macau government website** <<http://www.macao.gov.mo>>

This is the official website of the Government of Macau Special Administrative Region of the People's Republic of China.

**Teledifusao de Macau** <<http://www.tdm.com.mo>>

This is the only free-to-air television and radio broadcaster in Macau, with programmes in Cantonese and Portuguese. Their website provides streaming video capabilities.

**Online services**

Since 1995, commercial Internet services have been provided by the CTM monopoly and a handful of pioneering companies (Macau Internet Gateway Services, Macau Web Ltd, MacauNet and Unitel). However, many of these companies have since stopped trying to compete with CTM in the provision of dial-up Internet access and have evolved into content-hosting companies. In 2002, CTM was the only provider of broadband services in Macau.

**Macau facts**

**Total population:** 436,700 (May 2002)<sup>30</sup>

**Key economic sectors (with percentages of GDP):** Industry (15%), services (85%)<sup>31</sup>

**GDP Per capita:** US\$14,281 (2001)<sup>32</sup>

**Literacy in the national language(s):** 90% (male 93%, female 86%)<sup>33</sup>

**Computer ownership per 100 inhabitants:** 17.86<sup>34</sup>

**Telephone lines per 100 inhabitants:** 40.4<sup>35</sup>

**Telephones per 1,000 inhabitants:** 849<sup>36</sup>

**Internet hosts per 10,000 inhabitants:** 4.22<sup>34</sup>

**Internet users per 10,000 inhabitants:** 2,254.46<sup>34</sup>

**Cell phone subscribers per 100 inhabitants:** 44.5<sup>37</sup>

**Sources:**

See notes.

As far as affordability and quality are concerned, Macau has adopted an interesting public tariff structure where service quality levels are inherent in the service licensing criteria of both Internet and telecommunications services. Regularly reviewed, Internet service tariffs are quoted on the websites of the ISPs as well as on that of the new regulator, the Office for the Development of Telecommunications and Information Technology (GDTTI).<sup>7</sup>

The tariffs and service quality requirements have led to a very transparent market for Internet services, where basic broadband services are available for MOP 160 (US\$19.93) per month with each hour costing MOP 2.8 (US\$0.35).<sup>8</sup>

In 2000, the Internet services market was liberalised with the government accepting applications for the provisional licence of Internet service from 1 October. The regulation on the provision of Internet services was finalised on 24 October. In October itself, 12 licences for Internet Services were issued.<sup>9</sup> Most of the licensees provide Web-application or database-hosting services, with Companhia Chinesa 2000 Online (Macau) Limitada<sup>10</sup> offering some competition to CTM in dial-up Internet access. Unfortunately long-time dial-up ISP MacauWeb stopped offering dial-up service from 12 September 2002. As of October 2002, there were 29,900 registered dial-up users who were online for a total of 1,046,016 hours. Since the introduction of ADSL broadband Internet service by CTM in July 2000, Macau has seen a steady increase in broadband usage. In July 2002, the total number of hours spent online via dial-up and broadband was about equal, at around 1,200,000 hours each. However, by October 2002, 15,496 broadband subscribers used 450,000 more hours than dial-up users.

There are only basic statistics on ICT usage in Macau provided by the Statistics and Census Service.<sup>11</sup> Angus Cheong and his colleagues at the University of Macau have conducted a number of interesting studies in 2001 and 2002 regarding how the Internet is being used in Macau. He found that PC penetration in families was around 64 percent, with 71 percent of PC owners also having online access. On average, the Internet was used for 9.5 hours per week with 6.1 hours from home, 2.3 hours from the workplace or school and 1.1 hours from elsewhere. While online, 3.2 hours were spent searching for information, 1.7 hours reading news, 1.5 hours on e-mail, 1.4 hours participating in chatrooms or forums, and 1.3 hours playing games.<sup>12</sup>

## Examples of innovative and key initiatives

Macau has long fostered distance learning initiatives. In March 1997, it began the Macau SchoolNet project with eight schools and dial-up Internet access, and now almost all educational institutions obtain subsidised Internet access via CTM's i.campus.<sup>13</sup> CTM's MacauE Learning also offers the possibility of online course authorship, enrolment, testing and tracking.<sup>14</sup>

## Enabling policies

The most significant enabling policy over the last two years was the partial liberalisation of market monopolies in gambling and telecommunications, thus allowing competition. This is a fundamental shift in what was previously a mutually beneficial relationship. Subsequently, 2 new mobile and 12 ISP licences have been issued by GDTTI <<http://www.gdtti.gov.mo>>.

## Regulatory environment

Telecommunications services, prior to 1981, were provided by the public sector in the form of Correios e Telecomunicações de Macau. Since 1981, a private company CTM enjoyed a monopoly under a concession contract from the government.

CTM was formed in October 1981 with a registered capital of MOP 70 million (US\$8.7 million). It is a joint venture between Cable and Wireless PLC (51 percent), Portugal Telecom International (28 percent), CITIC Pacific (20 percent) and the Macau SAR government (1 percent). The 20-year exclusive licence, granted on 18 August 1981, was revised by the Sino-Portuguese Liaison Group during negotiations surrounding Macau's return to Chinese sovereignty, and an agreement on its renewal was reached on 19 October 1999.

Under the terms of the renewal, Macau adopted a key enabling policy by partially liberalising its telecommunications

market and in June 2000 it split telecommunication regulation from that of postal services with the formation of GDTTI.<sup>15</sup>

The concession contract makes fascinating reading.<sup>16</sup> Specifically, it agreed that CTM's monopoly in fixed-line, telegram and telex services, fixed service for data transmission and rental circuit services was to be renewed for another 12 years, until 31 December 2011. However, Internet, mobile, long-distance voice telephony on mobile and other value-added services were to liberalise in 2001.

Interestingly, CTM pays a 9 percent royalty of its total operating revenue<sup>17</sup> to the government, which reserves the right to redeem the CTM concession in 2006 after a review and by giving one year's prior notice. The government also reserves the right to terminate the concession in the "Public Interest".

After a selection from eight bids in October 2000, two new entrants in the mobile market were issued mobile phone licences on 1 March 2001: Hutchison Telephone (Macau) Company Limited<sup>18</sup> (a joint venture between Hong Kong's Hutchison Whampoa and Japan's NTT DoCoMo) and SmarTone Mobile Communications (Macau)<sup>19</sup> (SmarTone and Delta Asia Financial Group).<sup>20</sup> These companies started offering GSM 900/1800 mobile services in August 2001, and as of October 2002 there were 173,085 subscribers of mobile phone services (39.6 percent of total population) and 102,403 prepaid rechargeable SIM cards of public mobile phone services. GPRS and WAP services are also offered. One of the unsuccessful bidders teamed up with CTM to offer its One2Free-branded mobile value-added services to CTM customers.

In August 2002, Macau made an exciting move by publishing regulations for the installation and operation of external telecommunications infrastructures (e.g. submarine cable).<sup>21</sup>

### Certification authorities

In December 2002, there were no active certification authorities (CA) in Macau. The Post Office (Correios de Macau) is understood to be considering offering digital certification services in 2003 and was running a logo design competition for the proposed CA (eSignTrust) at the time of writing.

### Domain name registry

There are currently five second-level domains (".com.mo", ".net.mo", ".org.mo", ".edu.mo" and ".gov.mo") under the ".mo" top-level domain, which is administered by the University of Macau as MONIC.

Although ".mo" was registered by the university in 1992, it was not until a leased line to the Internet was established in 1994 that domain name services were offered to the public.

Currently, there are no annual fees for third-level domain names under “.mo” – only a single application fee of MOP 200 (US\$25) per domain name is charged to cover administration costs. Primary names servers for any third-level domain name must be operated within Macau, and individual domain names are not available under “.mo”. Given the relatively stringent enforcement of registration criteria, there are few domain name disputes. MONIC is a founding member of the Chinese Domain Name Consortium.<sup>22</sup>

According to the July 2002 Network Wizards’ Internet Domain Survey, there are only 152 Internet hosts under the “.mo” domain with 57 third-level domains registered.

To register under “.com.mo”, commercial entities need to provide documentary evidence such as their Macau business licence. See <<http://www.umac.mo/sub-domain/sub-domain.html>> for more details.

## Open source movement

Open source software is being actively promoted by local ICT-related associations and educational bodies, with CPTTM providing specific training in supporting Red Flag Linux, a Chinese version of Linux developed by the Chinese Academy of Sciences. This version of Linux has strong support from the Chinese government. There is also a Tucows mirror site hosted by CTM<sup>23</sup> and a local Linux users group.<sup>24</sup>

## Research into ICTs

Operating since July 1992, the United Nations University’s International Institute for Software Technology (UNU/IIST)<sup>25</sup> is a research and training centre specifically focused on the software technology needs of developing countries. By working with other universities in developing economies, it helps to improve, develop and train their staff and students in advanced software engineering techniques. By doing so, it helps to strengthen their teaching and research curricula in computer science and software engineering and their ability to produce computer software.

In February 2001, Cisco Systems established its first regional Networking Academy in Macau by partnering with CPTTM. There is frequent collaboration on other research and educational activities between the University of Macau,<sup>26</sup> Macau Computer Association,<sup>27</sup> Macau Information Technology Education Association<sup>28</sup> and Macau Information Technology Association.<sup>29</sup>

## Future trends

The next few years will be especially important for Macau as the world watches if it successfully follows through with its careful steps in liberalising the gambling and telecommunications markets.

So far, there has been no serious competition to CTM in the provision of Internet services in Macau and, with the trend towards broadband services continuing, it would appear that the only broadband provider, CTM, will only get stronger at the expense of dial-up competitors. Already some providers are withdrawing from the market (e.g. MacauWeb).

Given the existing tariff-based pricing, should service costs become unaffordable or prohibitive, GDTTI would be expected to respond accordingly. Perhaps the new regulations on external facilities will attract competitive international bandwidth to land in Macau (e.g. from Hong Kong) and further drive prices lower, or market forces could replace the existing tariff structure.

In any case, demand for international services are expected to rise, especially after the new casino licensees begin operations. Already the new mobile service providers are leveraging their home networks in Hong Kong to help service Macau tourists, the majority coming via Hong Kong. With the development of remote monitoring services, it is unclear whether the new casino operators will station their monitoring staff in Macau or simply ship the video back to Las Vegas where they already have the operating infrastructure. International demand for data services will also increase if Macau is successful in promoting itself as an “offshore” financial and banking centre.

There will no doubt be further pressure on local content development and the use of Portuguese as economic and cultural ties between Macau, Hong Kong and China become even closer (e.g. after construction of the Zhuhai-Hong Kong bridge).

The risk of not fostering and maintaining Macau’s unique Portuguese/Macanese cultural heritage is lost tourist and trade opportunities with Portuguese-speaking economies (e.g. Brazil, Mozambique, Portugal).

Finally, with the adoption of ICTs and the localisation of the civil service, the development of e-government initiatives will lead to increasing transparency and responsiveness. Macau’s legal framework will need to be upgraded to address the new opportunities created by GDTTI.

## Select bibliography on Macau

Chan, S.S, “The Liberalization of Macau’s Telecommunications Market”. In *Leading Issues of the Macau Economy*, Chapter 5, pp. 75–92. This provides a short overview of how Macau’s telecommunications sector has evolved over the last 20 years and touches on issues surrounding its liberalisation.

Cheong, Weng Hin, (2000). “Internet Adoption in Macau”. *JCMC*, 7(2) January. <<http://www.ascusc.org/jcmc/vol7/issue2/macao.html>>. This and other studies by Angus Cheong are probably the most comprehensive studies on the impact of the Internet on Macau to date.

Infocomm Development Authority of Singapore (2002). *Factbook on the Telecom and IT Industry in Asia*. This gives a useful executive overview of the telecommunications market in the Asia-Pacific region, with a brief section on Macau on page 65.

Lee Chi Ming Jimmy, (1996). “The Internet Market of Macau: An Exploratory Study”, MBA thesis, University of Macau. This provides a historical snapshot of the Internet scene in Macau briefly after commercial Internet services were introduced.

Leong Wan Chong. *Macau 2020: The Long Term Objectives and Development Strategies in 20 years*, pp. 55–115. Macau Development Strategy Research Centre. This is an interesting study of how to position Macau’s economy over the long term.

*Telecom Daily*, Issue 954, 23 October 2001. <<http://www.telecom-daily.com/asia/archive03/issue%20954%20Macau.pdf>> This contains a nice set of tables summarising key telecommunications, Internet, wireless and broadcasting statistics.

Yee, Herbert S. *Macau in Transition: From Colony to Autonomous Region*. This fascinating book provides a historical and political context of Macau’s return to Chinese sovereignty. Chapter 7 on the Macanese is illuminating.

## Notes

1. Statistics and Census Service, May 2002. *Macau in Figures* <<http://www.dsec.gov.mo/html/English/numeros/pdf/2002.pdf>>.
2. Statistics and Census Service <<http://www.dsec.gov.mo/html/English/index.html>>.
3. Macau Factsheet <[http://www.macau.gov.mo/factsheet/tourism\\_en.phtml](http://www.macau.gov.mo/factsheet/tourism_en.phtml)>.
4. Macau Factsheet <[http://www.macau.gov.mo/factsheet/geography\\_en.phtml](http://www.macau.gov.mo/factsheet/geography_en.phtml)>.
5. TDM <<http://www.tdm.com.mo>>.
6. Interesting Study by Angus Cheong <<http://www.himacau.org.mo/survey>>
7. GDTTI <<http://www.gdtti.gov.mo>>.
8. CyberCTM tariffs <<http://www.cyberctm.com/cs/tariff.en.phtml>>.
9. GDTTI <<http://www.gdtti.gov.mo/eng/Facts/ispliclist.html>>.
10. Chinese 2000 Direct Network (Macau) Limited <<http://www.c2kol.net>>.
11. Statistics and Census Service <<http://www.dsec.gov.mo/html/English/index.html>>.
12. World Internet Project <<http://www.cnnic.net.cn/news/91/Social%20Impact%20of%20the%20Internet-CNNIC.ppt>>.
13. CTM i.campus <<http://www.i.campus.ctm.net>>.
14. MacauE Learning <<http://www.macaelearning.com>>.
15. Creation of the GDTTI <[http://www.gdtti.gov.mo/por/laws/67\\_2000.html](http://www.gdtti.gov.mo/por/laws/67_2000.html)>.
16. Concession Agreement <[http://www.gdtti.gov.mo/eng/laws/concession/ctm\\_chap1.htm](http://www.gdtti.gov.mo/eng/laws/concession/ctm_chap1.htm)>.
17. Concession Agreement, Chapter 8, <[http://www.gdtti.gov.mo/eng/laws/concession/ctm\\_chap8.htm](http://www.gdtti.gov.mo/eng/laws/concession/ctm_chap8.htm)>.
18. Hutchison Telecom – Macau <<http://www.hutchisonmacau.com/eng/index.jsp>>.
19. SmarTone – Macau <<http://www.smartone.com.mo>>.
20. GDTTI <<http://www.gdtti.gov.mo/eng/laws/index.html>>.
21. GDTTI <[http://www.gdtti.gov.mo/por/laws/16\\_2002.html](http://www.gdtti.gov.mo/por/laws/16_2002.html)>.
22. Chinese Domain Name Consortium <<http://www.cdnc.org>>.
23. Tucows Macau mirror site <<http://tucows.macau.ctm.net>>.
24. Macau Linux Community <<http://www.macaulinux.org/index.php>>.
25. UNU/IIST <<http://www.iist.unu.edu>>.
26. University of Macau <<http://www.umac.mo>>.
27. Macau Computer Association <<http://www.mca.org.mo>>.
28. Macau Information Technology Education Association <<http://www.itea.org.mo>>.
29. Macau Information Technology Association <<http://www.ita.org.mo>>.
30. Statistics and Census Service, May 2002. *Macau in Figures* <<http://www.dsec.gov.mo/html/English/numeros/pdf/2002.pdf>>.
31. Statistics and Census Service, May 2002. *Macau in Figures* <<http://www.dsec.gov.mo/html/English/numeros/pdf/2002.pdf>>. Financial intermediation services were indirectly measured, and an adjustment of –5.7 percent was required to bring total GDP down to 100 percent.
32. Statistics and Census Service <<http://www.dsec.gov.mo/html/English/index.html>>.
33. 1981 estimate, defined as age 15 years and above who can read and write. <<http://www.cia.gov/cia/publications/factbook/geos/mc.html>>.
34. ITU, (2002). *Asia-Pacific Telecommunication Indicators 2002*, p. A-20.
35. Statistics and Census Service, May 2002. *Macau in Figures* <<http://www.dsec.gov.mo/html/English/numeros/pdf/2002.pdf>>.
36. Statistics and Census Service <<http://www.dsec.gov.mo/html/English/index.html>>.
37. Statistics and Census Service, May 2002. *Macau in Figures* <<http://www.dsec.gov.mo/html/English/numeros/pdf/2002.pdf>>.