ABSTRACT

As part of the process of determining interconnect charges and establishing a price cap regime for Cable & Wireless Jamaica (C&WJ), the Office has requested and received various submissions from the Company regarding the values of its fixed assets and the principles and methods used for purposes of asset valuation. These submissions include gross book value of assets at current cost submitted in 2000, explanation of various indices utilized by the Company, method and rates of depreciation, and the results of a September 2001 Modern Equivalent Asset (MEA) Study for certain categories of telecommunications equipment. Aided by comments from interested parties and the advice of external consultants, the Office has over a two-year period conducted extensive enquiries into the principles and methods used by the company to determine asset values with a view to arriving at figures that are consistent with Modern Equivalent Asset Valuation (MEA).

In this Notice the Office sets out its determination with regard to valuation of C&WJ's assets for regulatory purposes. The valuation methods and principles set out herein will be used by the Office for making determinations regarding interconnection charges and key price cap parameters.

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CHAPTER 1: Regulatory Framework

Introduction

1.0 The Telecommunications Act, 2000 provides *inter alia*, for the Office of Utilities Regulation (the Office") to undertake regulatory activities relating to the assessment and arbitration of pre-contract disputes relating to interconnection and inclusive of charges. The Act stipulates that prices for interconnect services must be cost oriented and that they should be established between Total Long Run Incremental Cost (TLRIC) and the Stand Alone Cost (SAC) of providing the service. In establishing such charges however, the following conditions must obtain:(i) interconnection charges shall not bear a disproportionate burden of common cost, (ii) costs shall be borne by the carrier whose activities cause those costs to be incurred, and (iii) costs shall include operating expenditure and depreciation and should be set at such levels as to give the carrier an opportunity to earn a reasonable rate of return. Charges for interconnection may also include provision for a supplementary charge, being a contribution towards the access deficit of the interconnection provider.

1.1 Section 46 of the Act confers powers on the Office to establish a formal system of price control for prescribed services. Additionally, provisions are made at various points in the Act for the establishment of various regulatory mechanisms to deter operators with market power from engaging in anti-competitive practices. Such mechanisms include rules for regulatory account and for competitive safeguard.

1.2 Determining the value of the relevant asset base is critical for the purposes of setting price caps and establishing interconnection charges. Assets in a telecommunications company consist mainly of the network infrastructure and the valuation of such assets has a major impact on charges to third parties and on the financial results of the company. Regulatory experience around the world has shown that where regulatory decisions are taken on the basis of accounting information, the quality and characteristics of that information are critical and that this not only depends on the methods employed for allocating assets across services but equally important are the principles, and appropriateness of the methods used for valuing assets. The method and rates of depreciation used for computing the value of net assets are also of critical importance.

1.3 The fixed asset register submitted to the Office by Cable & Wireless Jamaica comprises thirty-one (31) classes of assets. On September 7, 2001, the company

submitted to the Office an estimate of the capital valuation of those assets used for providing services subject to price caps and used in the provision of interconnection services. The estimates covered eleven of the thirty-one asset classes, namely: Central Office Switching, (C.O.Switching) Satellite & Earth Station, Central Office Transmission (C.O.Transmission), Poles, Metallic Aerial Cable, Non-Metallic Aerial Cable, Metallic Underground Cable, Non-Metallic Underground Cable, Metallic Submarine Cable, Non-Metallic Submarine Cable, and Underground Conduit.

1.4 The Office sets out in this document, its determination with respect to key elements of the valuation study carried out by C&WJ, including:-

(i) methods for valuation of C&WJ's assets;

(ii) asset base for purposes of interconnection and price caps;

(iii) depreciation method and rates to be used for regulatory purposes; and

(iv) rates of return for purpose of interconnection charges and price caps.

Public Consultation

1.5 Regulatory decisions typically affect not only the incumbent but also new entrants, who have a legitimate interest in the incumbent's accounting methods. As such, the required accounting principles and methods must be demonstrable transparent, without compromising an operators legitimate commercial confidentiality.

1.6 The Office is committed to the principles of transparency specified in the Telecommunications Act but is also required to balance this against the obligations under the Act to treat as confidential information so designated by a licensee. Most of the data supplied to the Office by C&WJ in the course of the examination of the Company's asset values was submitted under confidential cover. The Office after careful consideration takes the view that in some cases the information so submitted represents commercially sensitive data that could compromise the Company's competitive position and as such has treated with confidentiality such information. One example of such confidential information is the level of trade discount received by the Company from suppliers of telecommunications equipment. This document details the process followed by the Office, the principles applied in its assessment of the information supplied by C&WJ and its determinations in respect of the various aspects of the Company's asset values.

Structure of the Document

1.7 The following issues are addressed in this document:-

* accounting methods and principles under the 1988 regime (Chapter 2);
* economic principles of asset valuation (Chapter 3);
* economic valuation of C&WJ's assets in 2000 (Chapter 4)
* C&WJ's MEA Study of September 2001 (Chapter 5)
* adjustments to C&WJ's MEA Study of September 2001 (Chapter 6)
* depreciation methods and rates for purposes of asset valuation (Chapter 7);
* asset base for regulatory purposes (Chapter 8); and
* asset valuation for future years (Chapter 9).

CHAPTER 2: Background

2.0 Prior to March 2000, the legal provisions governing rate setting for the monopoly telecommunications company were set out in the All Island Telephone Licence issued in 1988 to C&WJ, formerly Telecommunications of Jamaica (TOJ). This licence included provisions relating to rate of return, methods of accounting, and specified depreciation rates for various classes of fixed assets.

Rate of Return

2.1 The rate of return is the return on capital that is required to attract the requisite investment. In general the rate of return constitutes a sizable share of a telecommunications company's total costs. In setting prices, tariffs, charges, etc. regulators usually aim to ensure that the regulated entity is given an opportunity to realise a reasonable return on investment. Under section 27(1) of the 1988 Licence, C&WJ was allowed to earn after-tax rate of return of 17.5-20% on shareholders' equity. The licence also outlined the basis for rate reviews and the frequency with which these could take place.

Methods of Asset Valuation

2.2 Section 27(2) of the 1988 Licence provided that for purposes of rate regulation,

"…the accounting methods applied shall be those used in the preparation of the last consolidated accounts of the Holding Company and its subsidiaries upon which the auditors have rendered an unqualified opinion prior to the adoption of this licence."

2.3 The All Island Telephone Licence was adopted on September 1, 1988. The last unqualified audited consolidated accounts of the Holding Company (Telecommunications of Jamaica) and its subsidiaries (Jamintel and Jamaica Telephone Company) were dated 31 August 1988. This audit was conducted by Price Waterhouse and Touche Ross Thornburn and Co and was based on the audited consolidated financial statements for the period ended 31 March 1988 and on the audited accounts of the subsidiaries for the three financial periods ended 31 March 1988.

2.4 That report therefore outlined the principles and methods to be used by the Group in subsequent years for purposes of asset valuation. It stated:-

"Plant in service is stated at replacement cost, using relevant industry indices for equipment purchased abroad (adjusted where applicable for exchange rate changes) and indices for local costs, taking into consideration modern equivalent units where applicable. Additions to plant and equipment include labour,

materials and an appropriate charge for overheads. An allowance for funds used during construction is capitalised, based on the average cost of funds."

Depreciation Rates

2.5 Depreciation rates for general property were not provided for in Schedule 1 of the All Island Telephone Licence. Based on the audited consolidated accounts (dated 31 August 1988) for Telecommunications of Jamaica, and its subsidiaries, however, the following were the applicable rates:-

(i)	Buildings and structures	2.00%
(ii)	Transport and mechanical aids	22.50%
(iii)	Tools and laboratory equipment	9.50%
(iv)	Office and stores furniture and equipment	9.50%
(v)	Other miscellaneous equipment	6.65%

2.6 The applicable depreciation rates for various categories of telecommunications equipment were set out in Schedule 1 of the Licence and are summarized in the Annex III. The licence had an initial life of twenty-five (25) years and did not allow for changes in depreciation rates in keeping with technological progress, which were to occur in subsequent years.

CHAPTER 3: Principles of Asset Valuation

3.0 The previous Chapter provides background to the accounting principles contained in section 27 of the All Island Telephone Licence for establishing the value of regulatory assets under the 1988 regime. With the promulgation of the Telecommunications Act, 2000, however these provisions were no longer binding. The Telecommunications Act, 2000 provides for the Office of Utilities Regulation to be the sector specific regulatory body. In carrying out this responsibility the Office took the view that it needed to establish the true economic value of C&WJ's assets, especially given its responsibilities to establish a price cap regime and to approve interconnection charges. This Chapter discusses some of the factors that are critical in determining the economic value of assets.

Current Cost Accounting (CCA) Vs Historical Cost Accounting (HCA)

3.1 In general there are two approaches in preparing regulatory accounts: (i) Historical Cost Accounting, and (ii) Current Cost Accounting. In some jurisdictions regulatory statements are prepared using both standards. Under the Historical Cost Accounting method ("HCA"), gross assets are valued at their original cost and net assets are valued at original cost less accumulated depreciation.

3.2 With Current Cost Accounting ("CCA"), gross assets and accumulated depreciation are revalued each year. They are both increased or decreased by the same proportion to reflect yearly valuation of assets. As a result of yearly revaluation, net plant, which is the difference between revalued gross plant and revalued accumulated depreciation, increases or decreases by the same proportion. Depreciation expense on a forward-going basis also increases or decreases in this same proportion.

3.3 In addition, under CCA, asset revaluations do not result in any reported change in operating profits or net income (at the time of the revaluation). On the contrary, they are treated simply as adjustments that make the accounts continue to reflect the *real* value of assets—even though prices in the general economy have changed. In general, the assets of a company are considered beneficial to its stockholders. According to the CCA perspective, the amount of that benefit is related to the *real* value of the assets—not the nominal value.

3.4 Finally, with CCA, an accounting entry is needed to offset the change in asset values resulting from revaluation. Otherwise, the revaluation would lead to a change in the reported value of retained earnings on the balance sheet. The

term “holding gains” or “holding losses” is sometimes used for this entry, depending on whether assets have been revalued upward or downward.

Modern Equivalent Assets

3.5 In terms of asset valuation, the preferred measure from the economic perspective is Modern Equivalent Asset (MEA). Under MEA the asset in place is valued at the cost of replacing it with the asset incorporating the cheapest proven technology that serves the same function. Where technology is rapidly changing, as in telecommunications the MEA would often embody a more up-to-date technology than the firm’s existing assets. Finally, for a company’s asset valuation to be consistent with MEA principles current cost accounting is the appropriate standard of accounting for determining gross and net value of plants.

3.6 The “economic value” of existing assets (embedded plant) is essentially the current cost of replacing the plant with one of the same functionality. Thus, the first step in establishing economic value is determining the cost of replacing existing assets with new assets that have the same functionality. An alternate valuation concept that is worthwhile noting is reproduction cost. This is the cost of replacing embedded plant with new plant of the same type and is therefore not the same as replacement cost, which is the cost of replacing plant with new plant that has the same functionality (and may be more cost effective than the same type of plant). Reproduction cost reflects some of the effects of technological progress. These real price reductions would be reflected in a reproduction cost index.

Economic Depreciation

3.7 Annual economic-depreciation expense is the change in economic value of embedded plant during a particular year. Accumulated economic depreciation is the total reduction in economic value of embedded plant since its purchase. Plant suffers from obsolescence and physical wear and tear, the effect of which is that they are worth less over time. Additionally, economic depreciation also results from changes in replacement costs over time. In particular, if the price of new equipment falls, the replacement cost of embedded plant falls. That, in turn, leads to economic depreciation and a reduction in the economic value of embedded plant. On the other hand, if the price of new equipment rises, there is an increase in replacement cost, which reduces economic depreciation. If the prices of new equipment rise sufficiently rapidly, economic depreciation may actually be negative.

3.8 Economic depreciation of telecommunications equipment derives primarily from technological progress. Such progress often reduces replacement costs over time. It also leads to the development of MEAs, which directly lower economic

values of embedded plant and additionally may be the primary factor limiting the economic life of embedded plant.

3.9 A first step in calculating economic value of embedded plant is calculating replacement cost. Certain adjustments are then made to this calculation to approximate economic value. Adjustments are normally done in order to reflect the following considerations :-

(i) embedded plant has a shorter remaining economic life than does newly purchased plant; and
(ii) embedded plant may have undergone physical deterioration and therefore have higher maintenance costs than newly purchased plant.

3.10 For these reasons, embedded plant generally has a lower economic value than newly purchased plant. These adjustments suffice if embedded plant is replaced with plant that is identical, except that it is new. In some instances, however, it would not be cost-effective to replace embedded plant with the same type of plant. It would instead be cost-effective to replace it with "Modern Equivalent Assets" ("MEAs").

3.11 Where replacing embedded plant with MEAs would be cost-effective, a further adjustment must then be made to replacement cost to get economic value since a new plant would embody valuable features that embedded plant does not have. Such features may increase revenues and/or reduce operating costs.

3.12 Several overseas jurisdictions (e.g. UK, Ireland, Australia) have used the MEA approach when estimating the replacement cost of particular assets. This gives credence to the Office's view that where the progress of technological is substantial, MEA is an appropriate basis for determining true economic costs of assets.

Determination 3.0: For those categories of telecommunications equipment that are subject to rapid improvement in technology, Modern Equivalent Asset (MEA) value shall apply for regulatory purposes.

Conclusion

3.13 For regulatory purposes, the most appropriate principle for asset valuation is Modern Equivalent Asset and in order to arrive at the true MEA values it is necessary to incorporate economic depreciation. MEA value and economic depreciation are consistent with the principle of Current Cost Accounting. The goal is to approximate the value of assets to their true economic costs and the best measure from the economic perspective is Modern Equivalent Asset (MEA).

CHAPTER 4: Economic Valuation of C&WJ's Asset Base

4.0 The Telecommunications Act at section 32 specifically requires C&WJ, to lodge a Reference Interconnect Offer (RIO) with the Office. Pursuant to this requirement C&WJ, lodged its RIO with the Office in March 2000. A revised version of the Offer was lodged in July of that same year. The Act also provides for C&WJ's services to be regulated by way of price caps as of March 2001. As part of fulfilling its responsibility to assess C&WJ's RIO and to establish an appropriate price cap regime, the Office upon receipt of C&WJ's RIO and supporting data, commenced a process of public consultation. As part of this overall exercise several studies were commissioned by the Office on matters relating to the 1988 regime and include inter alia:-

(i) the methods used to establish values for various categories of assets;
(ii) the depreciation rates for various categories of assets especially in light of rapid technological changes in telecommunications; and
(iii) the rate of returns for purposes of interconnect charges and price caps services.

The goal of the Office was to ascertain the appropriateness of those practices on a forward going basis. The Office's findings with regard to each of the above are discussed below.

Table 4.0: Valuation Methods

Classes of Telephone Plant	Method of Valuation
Buildings	Valuations by the independent valuator Goldson Barrett Johnson
Cable Held for Future Use	Market prices of suppliers, converted to Jamaican dollars.
Underground Conduit	Construction civil material indices developed by Goldson Barrett Johnson.
Foreign Materials and Foreign Labour	The C. A. Turner Telephone Plant Index
Local Labour	An index that reflects CWJ's average payroll cost, per head.
Overheads	An index that reflects movement in the rate of interest applied to C&WJ's plant under construction.

4.1 The Table above lists the various methods used by C&WJ to value various categories of assets.

Absolute Valuation

4.2 Buildings and cable held for future use are valued on the basis of the absolute valuation method. Since market price is the proper standard for determining the economic value of buildings, the Office considers it entirely appropriate to use independent valuator to evaluate buildings. Indeed, this is standard international practice. It is also appropriate to value cable held for future use at their current supply price (adjusted for exchange rate changes). Market price is also the proper standard for determining the economic value of cable inventories.

Determination 4.1: The Office has determined that the practices of valuing building on the basis of independent market valuation and cable held for future use on the basis of current market prices are acceptable for the purposes of asset valuation.

Indexation

4.3 Indexation is an appropriate method when there has been little technological change in the asset category and all the direct costs associated with bringing the asset into service would be incurred if it were to be replaced today. Among the advantages of indexation is that the valuation is directly linked to the historical values of assets. In using the indexation method there may be difficulties in establishing appropriate indices and hence it may be more accurate and reliable to use physical volumes and unit prices to derive an absolute valuation. This method in turn may present difficulties, for example in establishing meaningful current unit prices so the choice of method for a particular asset depends on individual circumstances.

4.3 The proper standard for evaluating conduit is replacement cost. In this regard the Office does not consider the use of construction civil materials indices to be unreasonable as it is probably a reasonable proxy for the replacement cost of conduit.

Determination 4.2: The Office has determined that the use of civil materials indices as a proxy for the replacement cost of conduit is appropriate for establishing asset values.

C.A. Turner Index

4.5 C&WJ employed the C. A. Turner Index to determine the value of foreign material and foreign labour in arriving at the reproduction cost for its local plant. The C. A. Turner Index is designed to be applied on a vintage and account level

basis to determine the reproduction cost of US local telephone companies' plant in service. The Office found two major problems with the Turner Index as applied to C&WJ's assets. Firstly, the foreign material component of the index does not reflect technological progress. Secondly, the labour component of the index does not take account of labour productivity in the company or in the wider economy.

4.6 The Office found that the Turner Index does not capture some types of technological progress. Three examples should suffice:-

* The non-cost benefits associated with new models of digital switches. The new models may have valuable new features in addition to lower purchase prices. New features often enable savings in operating costs and/or generation of additional revenues. Such additional capabilities are economically equivalent to reductions in the purchase prices of the switches.
* The cost savings possible by using new circuit equipment with larger capacity than that of older circuit equipment. An older optical fiber cable might operate at the OC-1 data rate, while a new one may operate at OC-3. Although the cost of an OC-3 terminal may be greater than that of an OC-1 terminal, the former accommodates many more circuits than the latter. In this regard the cost per unit (circuit) of the OC-3 would then be much less than that of the OC-1, but it might not show up if units of equipment, rather than circuits, are being tracked.
* The cost savings possible by using fiber-optic systems instead of copper cable in the feeder loop plant.

4.7 The shortcomings of the Turner Index were evidenced by the following observations:

* The Turner Index for digital switching declined over time, but it did not decline as rapidly as the actual decline in switching costs.
* The Turner Index for circuit equipment was fairly flat for the most recent years although it was likely that the economic costs of such equipment had actually declined significantly, given the possibility for using newer, larger-capacity systems.
* Although the cost of loops had likely increased over time, such increases would have been mitigated by the use of fibre optics and loop carrier systems. As a result, the increase in loop costs should have been less than indicated by the Turner index.

4.8 Given the above observations, the Office concluded that C&WJ's asset revaluations based on the Turner Index did not fully reflect the downward effects on costs resulting from technological progress.

Determination 4.3: The Office has determined that C&WJ use of the Turner Index for asset valuation did not allow for the full embodiment of the downward effect on costs resulting from technological progress.

Payroll Cost Per Head

4.9 C&WJ used payroll cost per head as an index of local labour prices. The problem with this approach, however, was that it failed to take account of labour productivity. It is likely for example that C&WJ's increased payroll cost per head reflected increased skill levels, education and/or greater average experience of employees. Furthermore, there was also the likelihood that labour productivity of the general economy had increased over time as the quantity and quality of capital inputs increased.

4.10 The importance of labour productivity is highlighted in a February 2000 study of the manufacturing sector in Jamaica that was conducted by the International Monetary Fund ("IMF"). The Study found that real output per worker went up by an average rate of 3.4 percent annually over the period 1989-1998. At the same time real compensation per worker increased at a lower rate of 3.1 percent.[1] The increased output per worker may reflect capital productivity, as well as labour productivity. Nevertheless, the data suggest that labour productivity may account for a large part of the increases in real compensation of manufacturing workers in Jamaica. This finding probably also applies to the employees of C&WJ.

4.11 C&WJ's labour index is also applied to foreign material and labour. This amounts to some double counting. The Turner Index reflects increases in labour costs that are capitalized. These costs include installation costs, which are significant for most types of telecommunications plant and quite large for cable. It is therefore incorrect for C&WJ to adjust for these labour costs a second time.

[1] Growth rates calculated from data in *International Monetary Fund, Staff Country Report No. 00/19*, "Jamaica: Selected Issues and Statistical Appendix," p. 24.

4.12 For these reasons the Office found that C&WJ's labour index contributes to overstating the value of embedded plant relative to newly purchased plant. This effect could conceivably be overbalanced by a sufficiently high rate of depreciation. To do so, however, the depreciation rate would have to be sufficiently high to correct for imperfections in the labour index, as well as to reflect the factors that cause the economic value of plant to decline over time.

Determination 4.4: The Office has determined that C&WJ's use of local payroll cost per head to construct a labour index as well as the application of this index to foreign labour and material resulted in an overstatement of the value of embedded plant.

Overheads

4.13 C&WJ's overhead costs consist of interest during construction and managerial labour overheads associated with plant under construction, ie. work-in-progress. The adjustment is based on estimated trends for overhead costs in Jamaica. This methodology seems reasonable.

Determination 4.5: The Office has determined that C&WJ's overheads, which includes interest during construction, and the cost of managerial labour during construction is not unreasonable as they reflect trends in the costs of such overheads for Jamaica.

Economic Depreciation

4.14 C&WJ's depreciation expense in 1997-1998 was 5.3 percent of gross plant. To ascertain the reasonableness of this rate, comparisons were made to the depreciation rates of U.S. companies. For the benchmark companies, the average rate of depreciation as a percentage of gross plant is 7.2 percent. The benchmark companies did not, however, revalue their assets annually. In order for C&WJ's revalued asset to be comparable to the asset values of those companies, C&WJ would have to have a depreciation rate of approximately 16.2 percent of gross plant. Given C&WJ's methods of revaluation, its actual depreciation rate is *far* too small to reflect declines in economic value. The effect of this is that it results in an overstated value for C&WJ's net plant.

Determination 4.6: The Office has determined that the depreciation rates applied by C&WJ during the period of rate of return regulation led to an overstatement of the Company's asset values and are therefore inappropriate for valuing assets going forward.

Conclusion

4.15 Below are the Office's conclusions coming out of the investigation and public consultation, which stated with the submission of C&WJ's in 2000.

(i) the Office expressed no objection to the use of the absolute valuation for revaluing buildings and cable held for future use.

(ii) C&WJ's asset valuation is based on current cost accounting methodology. This methodology is based on the Turner Index and does not include adjustments for replacement technologies, and in this regard does not equate to MEA valuations.

(iii) the net values of C&WJ's fixed assets were overstated due to long asset lives.

(iv) the rate of return for purposes of interconnect pricing and price caps should be adjusted downward to reflect the over-valuation of net assets.

(v) a study using MEA principles should be carried out with respect to those assets used for purposes of interconnection and the services covered by price caps regime.

CHAPTER 5: C&WJ's Modern Equivalent Asset Study

5.0 Subsequent to the Office's assessment of C&WJ's 2000 assets submissions, the Company commissioned an MEA Study. The result of that Study is summarized below. According to Annex 1 C&WJ's fixed assets are grouped into thirty-one (31) asset classes and many of these broader categories are made up of sub-categories. Of the thirty-one classes less than 50% were considered in the MEA exercise carried out by the company the results of which were submitted to the Office on September 7, 2001.

5.1 The goal of the MEA exercise carried out by C&WJ was to obtain estimates of the Gross Replacement Cost (GRC) and Net Replacement Cost (NRC) for various classes of assets used for providing interconnect services and price caps. The MEA valuation focused on asset values over the period March 2000 (opening date) and March 2002 (closing date). Specifically, the MEA Study zeroed in on those classes of assets used for providing interconnection and the services covered under the existing price cap plan.

5.2 The Office had previously indicated that it had no objection to valuation of buildings using the independent valuator Goldson Barrett Johnson and so this class of assets was exempted from the MEA study. Also exempted from the Study are asset classes 21120 (motor vehicle) and 21140 (special purpose vehicles). This is because the company does not own motor vehicles and special purpose vehicles but rather leases them. Work equipment, test equipment, training school equipment, furniture, office support equipment and general-purpose computers are valued at market price. The Office had also previously indicated that this is an appropriate approach. Telex and station accounts (including large PABX/PBX) were not included, as they are not associated with interconnection and not included in price caps.

Valuation Methods

5.3 For the purposes of this document all asset classes listed in Annex II with the exception of 22120 (C. O. Switching), 22311 (Satellite & Earth Station) and 22312 (C. O. Transmission) are referred to as Outside Plant equipment. Each of the eleven-asset class is made up of a number of sub-categories. With regard to Asset Class 22120 and 22312, the absolute valuation is used to value PSTN switches and PSTN Transmission. The remaining sub-categories of both classes are valued using indexation. The use of a combination of Absolute Valuation and Indexation for MEA valuation is not an unusual approach to deriving the MEA value of assets. British Telecoms (BT) for example, applied a combination of

indexation and absolute valuation in preparing and reporting its current cost accounting statements for regulatory purposes.

Table 5.0: Valuation Methods

Asset Class	Asset Description	Current Cost Accounting Valuation Methodology
22120	C. O. Switching	Absolute Valuation & Turner Indices
22311	Satellite & Earth Stations	Absolute Valuation
22312	C.O.Transmission	Absolute Valuation & Turner Indices
24110	Poles	Absolute Valuation & Turner Indices
24211	Metallic Aerial Cable	Absolute Valuation & Turner Indices
24221	Metallic Underground Cable	Absolute Valuation & Turner Indices
24212	Non-Metallic Aerial Cable	Absolute Valuation
24222	Non-Metallic Underground Cable	Absolute Valuation
24241	Submarine Metallic Cable	Absolute Valuation
24242	Submarine Non-Metallic Cable	Absolute Valuation
24410	Underground Conduit	Absolute Valuation

C. O. Switching Equipment

5.4 Valuation of this class of assets was done using a combination of Turner Index and Absolute Valuation. The goal of the valuation was to arrive at the replacement cost for C&WJ's core voice switching plant. The evaluation includes local, tandem, remote, and international gateway switches as well as switches supporting operator services, and signaling equipment, including the data switches, known as Signal Transfer Points (STPs) that are used in the signaling network. The different switch models used are: DMS-100/200, OPAC, RSC, TOPS, DRSC-S, DMS-500, RSC-S, RLCM, GSP, BBSTP, and OSC. For these assets the Absolute Valuation method was applied.

5.5 The absolute valuation was based on an engineering assessment of C&WJ's network in Jamaica and was carried out by Nortel. Essentially it sought to determine the specific equipment quantities required for each switch in the network, based on the number of lines and trunks served by such switches.

5.6 C&WJ's valuation of PSTN C.O. Switching by way of the absolute valuation method reflect assumptions relating to volume discount on prices of telecoms equipment, duty insurance and freight, the level of spare capacity and the

treatment of network planning related expenses associated with capital additions, and interest during construction accruing to work in progress. These issues are fully explored in the next Chapter.

5.7 The other equipment comprised the category of assets known as C. O. Switching: outside plant, transmission, synchronization network, satellite uplink station assets, OSS/BSS, and power plant (e.g. generators) MDF, cross-connect/jumper wire, voice mail system and information network platforms i.e. 1-800, 911, etc and furnishings. These were valued using the Turner Index.

International Benchmarks

5.8 Upon receipt of the valuation results the Office sought to ascertain the reasonableness of the estimates by making comparison with estimates from other jurisdictions. The approach involved the development of comparable measures, such as cost per line for C&WJ's MEA switching and comparing these with the costs per line found in other jurisdictions.

5.9 Modern telecommunications switching equipment consists primarily of a special purpose computer (the main processor) a semi-conductor array for actually making connections (the switch matrix), devices for interconnecting with local lines (line ports), devices for interconnecting with trunk lines (trunk ports), and miscellaneous other equipment used in common such as power supplies, signaling units, measuring devices, cabling, cross connect frames and so forth. The cost of the central processor varies somewhat with the call attempt capacity of the switch. However, it is not a continuous variation- different sizes of switches or switches with different functionality, ordinarily will have different sizes of processor. The cost of the switch matrix, which is a small part of the total switch cost, varies with the total usage, but again this tends to be different for different switch models that may have substantially different capacities, rather than vary continuously with traffic demands. Miscellaneous equipment also does not vary with small changes in traffic levels, but can have different costs depending upon the switch model, function and capacity. On the other hand, the number of line and trunk ports, and their costs, do vary directly with the number of lines or trunk terminating on a particular switch.

5.10 As competition has spread through the world's telecommunication systems, there has been an increasing need to determine the costs of various types of equipment in order to support prices for interconnection, or, in some cases, prices for specific network elements that must be offered to competitive entrants. Generally, the costing theory that has been used in such analyses has been that of Total Element Long Run Incremental Cost (TELRIC)—the cost of adding the

specified equipment to the network at today's prices, where all equipment elements can be varied. This is the same formulation as MEA.

5.11 In order to evaluate the reasonableness of C&WJ's estimates costs, it is therefore appropriate to compare them with TELRIC and Total Service Long Run Incremental Cost (TSLRIC) studies that have been performed in other countries in recent years. The countries that have been at the forefront of telecommunications liberalization, and therefore have been most active in developing such studies, have been the United States and the United Kingdom.

5.12 In the Untied States, interconnection between local and long distance carriers has been in effect since 1984, and, since the promulgation of the Telecommunications Act, 1996, interconnection among competing local exchange carriers has also been required. Additionally, the 1996 Act required incumbent local exchange carriers to unbundle their networks and make the various elements available to others at cost-based prices. Generally, interconnection prices have also been cost based, with the most common costing approach to all pricing being TELRIC. In support of the development of these prices, a number of studies of the costs of equipment, including switching equipment, were undertaken. These studies were submitted in numerous Federal and State proceedings by various parties, and were the subject of intense scrutiny by regulators and interested parties. Nevertheless, as will be shown, study results tended to vary depending in part on who had sponsored them. Generally, the Incumbent Local Exchange Carriers (ILECs) wanted high prices, while their competitors wanted low prices.

5.13 The studies all tend to have the same structure, based on the technical structure of modern switching systems. To a first approximation, the cost of a particular type of switch will consist of a fixed cost plus a cost per line plus a cost per trunk. Thus, for a particular class of switching system, the costing formula will be of the form $a + bx + cy$, where

- a is a fixed cost associated with a particular size and type of switch (e.g. host switches with a maximum size of 50,000 lines),
- b is the cost per line,
- x is the number of equipped lines,
- c is the cost per trunk, and
- y is the number of equipped trunks.

5.14 The trunk ports are often subsumed into the per-line cost by using a standard line to trunk ratio, typically about five to one, and recalculating b as a composite port cost. Using this formulation, the formula becomes: a + bx where

a is the same as defined above,
b is the composite port cost, and
x is the number of equipped lines.

The total per-line cost of a particular switch is then given as b + a/x

5.15 Since different networks are of different total sizes, and may have switches of different sizes made by different manufacturers, it is useful to compare costs based on a cost per line basis. Such an approach allows comparisons to be made on a common basis. All of the analyses discussed below were based on the specific switch sizes and types in C&WJ's network.

5.16 In order to validate the results comparisons were made with the costs with some international benchmarks. As described above, switch costs are often characterized by a cost per line. In calculating a cost per line of switching equipment, those switches that do not directly serve lines, which, in the case of Jamaica are the international gateways, the STPs and the OSC systems were removed. Removing these and dividing by the number of equipped lines leads to a total cost per line of between 300-400 US dollars. . This is extremely high when compared with the studies listed below.

(i) The Hatfield Associates Inc. (HAI Model)

5.17 The HAI model is a cost model that has been widely used in the United States since about 1997. This model was sponsored by companies (Competitive Local Exchange Carriers – CLECs) wishing to interconnect with Incumbent Local Exchange Carriers (ILECs) or lease unbundled network elements from them. The sponsors of the HAI Model were interested in having such prices, and the costs on which they were based, be as low as possible. It should come as no surprise, therefore, that HAI's costs were at the low end of the range of cost estimates developed using various models. HAI is a complete TELRIC model of a local telephone network, including loops, trunks, switches and all other equipment needed to operate a telephone company, although it assumes the wire centres remain in their existing locations. The underlying data for the study was obtained from a number of different sources.

Table 5.2: HAI Model For Prices of Switching Equipment Investment

[Investment = a + bx, where a is switch fixed investment and b is per-line portion of investment]

	Fixed Switch Investment (a)			Per-Line Investment (b)		
Switch Size (in lines)	Stand-Alone	Host	Remote	Stand-Alone	Host	Remote
640	$ 175,000	$ 183,750	$ 55,000	$ 75.00	$ 75.00	$ 83.00
5,000	$ 175,000	$ 183,750	$ 70,000	$ 75.00	$ 75.00	$ 85.00
10,000	$ 475,000	$ 498,750	$ 225,000	$ 73.00	$ 73.00	$ 70.00

5.18 The HAI switch costs are presented in the a + bx form outlined above, with a and b varying with the size of the switch (640, 5000, or 10,000 lines) and the functionality (Remote, Host or Stand-Alone).[2] The specific model parameters are presented in Table 5.2 above.

5.19 Applying HAI to C&WJ's network (and using the closest appropriate switch size) as described in the Nortel analysis, and assuming that all switches that are not remotes are hosts, yields a total cost per line of between US100-200 dollars.

(ii) The Benchmark Cost Proxy Model (BCPM)

5.20 BCPM has also been used in numerous regulatory proceedings in the United States both at the state and federal level. The development of this model was spearheaded by a consortium of Incumbent Local Exchange Carriers (ILECs), using their own internal cost data. Implicit in the model is the assumption that ILECS receive a 50% discount from list prices for switching equipment. Since the ILECs were interested in developing higher prices, and hence higher costs, it should come as no surprise that the BCPM model yielded higher costs than HAI. The switching cost portion of BCPM is also of the form a + bx, although in this

[2] Using the 10,000 line factors for larger switches would seem to yield a higher cost estimate than if there were a still larger category, since per-line costs tend to drop as switches get larger.)

case the a and b factors vary by equipment type (Northern Telecom DMS or Lucent 5ESS) and function (remote, standalone of host). The specific parameters of the BCPM model are presented in Table 5.3 below.

Table 5.3: BCPM Prices For Switching Equipment Investment

[Investment = a + bx, where a is switch fixed investment and b is per-line portion of investment]

	Fixed Switch Investment (a)*			Per-Line Investment (b)		
Switch Type	Stand-Alone	Host	Remote	Stand-Alone	Host	Remote
DMS 100	$ 1,090,678	$ 1,423,915	$ 172,925	$ 179.37	$ 170.94	$ 197.51
5ESS	$ 980,238	$ 1,121,515	$ 321,100	$ 150.65	$ 135.12	$ 138.21

*CALCULATION OF (a) FOR BCPM: BCPM employs regression, so the (a) parameter is calculated as the sum of all estimated parameters for a 5,000-line switch, including the constant, multiplied by sample data of 4000 trunks, 2.5 calls, 3.5 line CCS, and dummy variables if 5ESS. A fifty percent discount was applied to the BCPM parameters, reflecting the BCPM discount assumptions.

5.21 Using the DMS-based parameters and applying them to the C&WJ network, again assuming that all non-remote switches are hosts, yields a cost per line of between US$200-$300.

(iii)The FCC Hybrid Cost Proxy Model (HCPM)

5.22 This model was developed by the US Federal Communications Commission in an attempt to find a middle ground between the HAI and BCPM. It also distinguished among host, remote and standalone switches, although it does not appear to differentiate among switches of different sizes. Generally, the fixed cost parameters (a) are between HAI and BCPM, while the per-line costs are similar to those put forth in HAI. The specific parameters of the HCPM model are provided in Table 5.3 below. Applying this model to C&WJ's network, assuming that all non-remote switches are hosts, leads to a total cost per line of between US$100 and US$200.

Table 5.4: FCC HCPM Model For Prices of Switching Equipment Investment

[Investment = a + bx, where a is switch fixed investment and b is per-line portion of investment]

	Fixed Switch Investment (a)			Per-Line Investment (b)		
Switch Size (in lines)	Stand-Alone	Host	Remote	Stand-Alone	Host	Remote
640	$ 415,042	$ 415,042	$ 62,673	$ 74.00	$ 74.00	$ 147.00
5,000	$ 415,042	$ 415,042	$ 62,673	$ 74.00	$ 74.00	$ 147.00
10,000	$ 415,042	$ 415,042	$ 62,673	$ 74.00	$ 74.00	$ 147.00

(iii) The Oftel Model

5.23 OFTEL developed a network cost model in 1996 based on data from BT and a number of other operating companies. The switch model, however, used the architecture of System X, a switch type produced in Britain for which BT is the only customer, and hence relies heavily on the BT data. The model was based on a single switch size, which appears to be about 28,000 lines, and yields a total cost per line of about US$280. This is high compared with most other approaches, and probably represents, in part, the relatively old system architecture of the System X and its concomitant high costs.

(iv) The Nippon Telephone and Telegraph (NTT) Analysis

5.24 In 1998, NTT developed a bottom up model of its costs, which yielded results about halfway between BCPM and HAI.

Conclusion of International Benchmark Analysis

5.25 The various approaches, when applied to the C&WJ network, yield the following cost estimates.

Model/Analysis	Estimated Switching Cost/Line (US$)
C&WJ	300-400*
HAI	100-200
BCPM	200-300
FCC HCPM	100-200
OFTEL	200-300
NTT	150-250

* Exclusive of the international gateways, STPs and OSC systems

5.26 The C&WJ results are far higher than international benchmarks. It is unlikely that there are significant inaccuracies in the Nortel analysis, and, of course, the international benchmarks are themselves not very precise (but yield higher costs than they would if the input data were current). The Office identified three potential sources for the apparent high cost of switching equipment reported by C&WJ. One is the loading factor, and the other is the apparently modest volume discount that is applied.

Difficulties with Benchmarking

5.27 The models discussed above are from two to five years old. Since the costs of switching equipment have been declining steadily with the declining cost of electronic components, it should be expected that current costs for all but C&WJ/Nortel are lower than those shown above.

5.28 For a number of reasons the various benchmark studies should be applied with extreme caution. First, accounting treatments across jurisdictions are not the same and hence consideration must be given to this in interpreting the results. For example, in the Hatfield and Oftel models indirect attributable costs are not included in the capitalized costs. Such costs are not ordinarily capitalized in the US or in the UK, so they are not included as capital costs in the models. Another reason is that there are network specific issues, which may cause a network to have a higher cost structure vis-à-vis operators in other jurisdictions. In addition the input assumptions for all the models were the default values published. That may affect the comparisons to the extent that C&WJ's design parameters differ from the models. In the US bottom up models interest is not capitalized. Freight

costs are likely to be higher in Jamaica than in the US and to the extent to which they are included in C&WJ's costs could bias the results upward.

Valuation of Transmission Equipment

5.29 The valuation of this asset class (22312) lists the current cost (MEA) of transmission equipment and covers such items as transmission termination and multiplexing equipment using fiber optic cable and radio systems. It does not include cables, ducts, poles or towers, which are separately itemized. The valuation of PSTN transmission equipment was done using the Absolute Valuation method. The remaining equipment were valued using the Turner Index.

5.30 The portion (PSTN) of C. O. Transmission reflect assumptions relating to volume discount of price of transmission equipment, duty insurance and freight, the treatment of network planning related expenses associated with capital additions, and interest during construction accruing to work in progress. These issues are fully explored in the next Chapter.

5.31 The Office also took note of the ratio of transmission to switching cost. The historic ratio tends to be in the 45-50% range for gross plant. The MEA Study, however, shows a value of Gross Replacement Cost far in excess of the historic cost, leading to a ratio of transmission to switching cost of approximately 73%. Switching and transmission equipment is based on the same underlying semiconductor technology, and hence the ratio should not change so drastically between the historic and current costs (MEA). On this account the Office took the view that the valuation for transmission equipment submitted by C&WJ appeared to be much too high.

Determination 5.1: The Office has determined that for the reasons discussed above, the value submitted by C&WJ for transmission equipment are too high and consequently requires - adjustments.

International Benchmarks

5.32 Transmission equipment has not been analysed as extensively as switching equipment, but a few international benchmarks have been found. As a preliminary step a comparison with some international benchmarks has been made. Generally, OFTEL, in the course of its analysis using data from BT, has estimated costs for 140 and 566 Megabits per second (mbps) terminal equipment, closely corresponding to OC3 and OC12 terminals (The UK uses the European digital hierarchy rather than the North American standard used in Jamaica, so we have used equipment with close to the same data rate to make

the comparisons.) HAI has also provided what it calls a "default value" for OC3 and OC48 terminals. The comparisons are set out in the Table below:

	C&WJ Loaded	OFTEL	HAI
OC3	$ 95,700	$ 44,353	$26,000
OC12	$228,680	$189,168	N/A
OC48	$191,400	N/A	$50,000

All values are in US dollars

5.33 It can be seen from this comparison that C&WJ's loaded transmission terminal costs are substantially higher than international benchmarks. As a word of caution these comparisons suffer from the same shortcoming as indicated for the benchmark studies of switching equipment.

Satellite Earth Station

5.34 As shown in Table 5.1 the MEA valuation of this class of assets was carried out using the absolute valuation method and reflect assumptions relating to volume discount of price of transmission equipment, duty insurance and freight, the treatment of network planning related expenses associated with capital additions, and interest during construction accruing to work in progress. These issues are fully explored in the next Chapter**.**

Outside Plant

5.35 This is a composite of all accounts with the exception of C. O. Transmission, C.O. Switching, and Satellite & Earth Station and includes cable and supporting structures. As shown in Table 5.0 some classes of assets making up this category were valued using either the Absolute Valuation method or the Turner Index or both. The portion of outside plant based on absolute valuation reflect assumptions relating to volume discount, duty insurance and freight, the treatment of network planning related expenses associated with capital additions, and interest during construction accruing to work in progress. These issues are fully explored in the next Chapter.

CHAPTER 6: Adjustments to MEA Valuations

6.0 The Office has made four types of adjustments to the MEA values submitted by C&WJ in the following areas: level of line cards and related spares for switching equipment, volume discounts, duty insurance and freight, and network planning.

Spare Capacity

6.1 The MEA valuation of C&WJ's switching assets carried out by Nortel is on the basis of 694,184 equipped lines, including line cards. As of March 1, 2001, the date of the Study, C&WJ had 509,008 fixed lines in service. This implies a 36.4% spare capacity in terms of line cards and related equipment. In other words the network for which Nortel established estimates of switching cost contained over 36% more equipped lines than were working at the time. C&WJ contends that the high rate of spare capacity in lines and line cards is to meet future growth in demand. The company cited its 1999 agreement with the Government of Jamaica under which it is obligated to install 217,000 gross lines over a three-year period. By way of a letter dated May 17, 2002 the company stated:

> *"Immediately following commencement of the Act, C&WJ began building out additional access line capacity and acquiring the necessary line cards in order to comply with its obligations to install the abovementioned number of lines. C&WJ has not only delivered on its commitment to provide additional gross access network lines but it has done so a year earlier than required. C&WJ currently has a surplus of line cards arising from the fact that customer line churn was higher than anticipated and qualified for the access line provision requirement."*

6.2 It is not unusual for telecommunications companies to equip their networks with extra line equipment in order to meet anticipated growth in demand. However, the Office took the view that the level of spares claimed by C&WJ is excessive and that for purposes of asset valuation a lower level of spares and related equipment would be appropriate. The Office therefore indicated to C&WJ that the MEA value of switching assets should be adjusted on the basis of a 15% level of spares. In arriving at this decision the Office took note of a number of arguments put forward by the company as justification for its existing level of spares.

6.3 Notably, although a large amount of switching equipment had been installed, other equipment necessary to provide "operational line stock" had not been constructed. The number of lines in service only increased by about 24,000 in 2000, and not at all in 2001, while the waiting list for service remained above 200,000. The Office reasoned that if the equipment installations had been undertaken in a manner that would have allowed more service to be provided, then the bulk of the installed capacity would have been used and the backlog

reduced. Had this happened, there would have been more revenue producing service in place to help support the additional capital expenditures. Since this has not happened, it does not seem appropriate to require the existing customers to pay for excess switching equipment that apparently cannot be utilized because of equipment shortages in other parts of the network.

6.4 C&WJ also contends that a surplus of line cards is due to higher customer line churn than was anticipated. Churn is indeed a reason for requiring lower fills in distribution plant, where cables are small and geographically constrained. In this case, a disconnecting customer may well "strand" a cable pair, with a new one being needed elsewhere. Switch capacity, and line cards in particular, exhibit entirely different characteristics. Since line cards can be immediately reused or moved if one customer disconnects and another connects, or if a customer moves (these are the usual reasons for churn) it is not, therefore, at all clear why higher churn should lead to an excess of line cards.

6.5 C&WJ also noted that growth rate for lines between 1999 and 2000 was 5% and that a growth rate of exactly 5% per year, compounded for three years, would lead to an overall growth of 15.76%. The truth however, however, is that the 5% growth rate is an approximation – indeed, although the growth rate between 1999 and 2000 was 5%, there was apparently a slight decrease in the number of working lines between 2000 and 2001.

6.6 Furthermore, the 15% spare assumed by the Office is generous. Normally, switching equipment is installed in relatively large units, such as switch modules, at relatively infrequent intervals. Thus, for example, if installations of such equipment are to be made every two years, then an increment of two years' growth would be added at each installation time, leading to an average spare of exactly one year's growth. Some additional spare to account for forecast errors must also be allowed, and the extra 10% or so proposed by the Office should be more than adequate for this purpose.Line cards, of course, should carry even less spare. These can be reordered frequently and warehoused centrally – so the level of forecast error will be smaller, as will the size of the reorder quantity. Hence, 15% spare for line cards is a particularly generous estimate.

6.7 In responding to the Office insistence on a lower level of spare for switching equipment C&WJ went on to suggest that not all of the costs of switches are directly sensitive to line size, and this is also true. However, when estimating aggregate capacities, not only the size of the switches but also the number of switches is likely to vary with the total number of lines served. Hence it is

appropriate in this case to reduce the cost by the same percentage as the reduction in line capacity.

6.8 C&WJ finally states that its budgeted annual growth is 7% plus an "error on line cards" of 25%, leading to three-year calculation of 23.5%. Given the uncertainties of these forecasts as compared with past history, however, plus the generous allowances for growth already built into the 15% estimate, the Office is convinced that the proposed level of spares (15%) is reasonable.

Determination 6.0: The Office has determined that the 15% allowance for spare is more than adequate to meet any foreseeable need, and that no larger number should be used when calculating the MEA value of the switch plant.

Volume Discounts

6.9 Telecommunications equipment providers invariably provide discounts to their list prices. These discounts depend upon many factors including the amount of equipment the purchaser orders. The Office received data from C&WJ indicating the level of discount it received from major equipment suppliers over a five-year period. For obvious reasons relating to commercial sensitivity the magnitude and range of such discounts are not disclosed by the Office. Suffice it to say however, that based on its own analysis of the data submitted by the company and survey of prices, the Office has made what it deems to be appropriate adjustments to these rates.

Determination 6.1: The Office has determined that the level of discount indicated by C&WJ was not reasonable and has therefore made appropriate adjustments. The Office has also determined that this is commercially sensitive information and has therefore opted to observe C&WJ's confidentiality claim.

Loading Factors

6.10 The relevant categories for loadings are freight insurance and duty, interest during construction and network planning cost. Table 6.0 below summarizes the various loadings initially applied to various classes of assets contained in the MEA Study.

Table 6.0: Proposed Loadings

Asset Class	Asset Categories	Freight, Insurance & Duty % of Cost	Interest During Construction % of Cost	Network Planning Cost % of Cost
22120	C. O. Switching	9	8	36
22311	Satellite & Earth Stations	9	8	36
22312	C.O.Transmission	16	8	36
All Other Classes	Outside Plant*	9	8	36

***** Comprising asset classes**:** 24110, 24211, 24221, 24212, 24222, 24241, 24242, 24410

Network Planning Costs

6.11 This is the largest and most complex of the loading factors applied by C&WJ. The loading for network planning costs of 36% was applied to the portions of C.O. Switching, C. O. Transmission and Outside Plant that were valued using the absolute valuation method with the exception of 22311 (satellite & earth stations).

6.12 For purposes of valuation C&WJ capitalises most of its network planning costs. The Company opined that this practice is consistent with international practice and thus should be appropriate for Jamaica. It cited BT's regulated financial statements where network-planning costs are capitalized. Another UK example cited by the company is the mobile operator One2One. C&WJ also argued that the capitalization of network planning expenses is the practice among the majority of 16 US based mobile operators based on a study carried out by its consultants PricewaterhouseCoopers.

6.13 For financial year 2000/2001 the Network Planning Cost was approximately $1B Jamaican dollars. These expenses relate to a raft of activities: external construction; external engineering, external plant planning, management of external plant; SVP engineering, cable maintenance and construction; external construction and maintenance; network installation, network projects, forecasting and analysis, external plant quality control, network engineering, and so forth.

6.14 The Office found that activities defined by C&WJ as Network Planning include a broad range of activities identified differently in other jurisdictions. Nonetheless, it is appropriate to capitalise some of these activities, particularly as part of the outside plant accounts. The Office approximated that 50% of total network planning category is associated with outside plant construction which almost

certainly represents a part of the capital cost of the outside plant. Another 26% is approximated as outside plant engineering. Thus, some 76% of the Network Planning expense is deemed to be appropriate to add to the outside plant capital accounts.

6.15 A further 11% of network planning expense appears to be related to the installation of C.O. equipment, and as such may be added to the portions of C.O. Switching and C.O. Transmission capital accounts valued using the absolute valuation method. The Office concluded that the remaining 13% of the Network Planning costs appears to be related to network operations, and should be considered an expense rather than as capital expenditure. These include costs expended for maintenance, network planning, forecasting, the operation of Engineering Vice President's Office and other operations matters. These are clearly not tied to particular items of equipment and should be classified as operating expenses rather than capital expenditures.

Determination 6.2: The Office has determined that 76% of the amount designated, as Network Planning expenses are appropriate to be added to the capital account of outside plant. Additionally, a further 11% of the amount so designated should properly be added to the portions of C.O. Switching and C.O. Transmission capital account, which is valued using the absolute valuation method. C&WJ has therefore been required to adjust these accounts to reflect this determination.

Interest During Construction (IDC)

6.16 C&WJ argued for the inclusion of Work In Progress (WIP) in the assets on which it is entitled to earn its real rate of return for those services subject to regulation. This includes interconnection services and price caps. In addition, to the inclusion of WIP the Company also proposed the inclusion of an interest charge to be added to the assets attracting the return. The Office requested data to support the estimates of WIP that had been submitted by C&WJ. In response to this request, C&WJ supplied the Office with information on projects included in the WIP category. The information supplied was only for projects with values greater than J$10 million that were started before April 1, 2001 and completed after that date. Thus the value reported represents the value of all projects under way as of that date. The value of projects underway on any other day would include some projects not itemized in the list supplied by the company while some of those itemized here would not yet have started, or would have been completed. If this is approximately a steady state condition (and there is no reason to believe otherwise) then the value of WIP on any other day would be similar to the value on April 1. Although the life of the projects is less than one year, the total value of all the projects that are in progress during the entire year is likely to be far greater than the data supplied to the Office show. The Office

therefore accepts the submitted C&WJ's value of WIP as representative of the average value of this account for its inclusion in the asset base on which the company is entitled to earn its real cost of capital.

6.17 On the matter of the capitalization of interest during construction the Office does not, accept the treatment proposed by the company. Regardless of the internal accounting arrangements utilized by C&WJ, it is clear that if an asset is attracting the authorized return to capital through its impact on telecommunications prices, there is no justification for an interest charge to be added to the assets attracting that return. Capitalisation of IDC may be done in lieu of including the WIP in the rate base, not in addition. To do otherwise would be double counting.

Determination 6.3: The Office has determined that the value submitted by C&WJ for Working In Progress (WIP) is reasonable but that capitalisation of Interest During Construction (IDC) must be done in lieu of including the WIP in the rate base not in addition.

Freight Insurance and Duty

6.18 C&WJ applied a loading factor of 9% for duty insurance and freight to most asset categories. These were explicitly added to the switching and transmission categories and included in other (mainly outside plant) study categories. It is also assumed that this factor is implicit in all Turner Index estimates. After further investigation and queries from the Office, C&WJ revised downward its estimates of this loading category to 2.38%. The Office accepts the revised estimates. The implications of this change on C. O. switching and C. O. Transmission are clear, since this factor was explicitly identified in the analysis. The valuations of other categories of outside plant also need to be modified to reflect this change, as do the Turner Index values. If the freight and other loadings that were included in the original valuations to which the Turner Index was applied were too high, then the original index value must be reduced by the appropriate reduction in these loadings, leading to an equivalent reduction in the indexed value. Freight insurance and duty only apply to material, not to labour. Thus, it was determined that for each category of plant, the fraction of the cost representing material should be reduced by a factor of 1.0238/1.09.

Determination 6.4: The Office has determined that the revised loading factor of 2.38% submitted by C&WJ for duty, insurance and freight is appropriate. C&WJ has therefore been required to apply this loading to all the applicable categories of plants. Thus for each applicable of plant, the fraction of the cost representing material should be reduced by a factor of 1.0238/1.09.

6.19 The Table below summarises the final loadings applicable to various categories of assets:

Table 6.1: Final Loading Factors

Asset Class	Asset Categories	Freight, Insurance & Duty as a % of cost	Interest During Construction as a % of cost	Network Planning Cost As a % of cost
22120	C. O. Switching	2.38		6.9
22311	Satellite & Earth Stations	2.38		21
22312	C.O.Transmission	9.38		6.9
All Other Classes	Outside Plant*	2.38		65

CHAPTER 7: Economic Depreciation

7.0 Under C&WJ's old accounting methods, gross capital and accumulated depreciation were first revalued. There after, annual depreciation charges were applied. Both the revaluations and the annual depreciation charges affect the value of net capital. In order for these procedures to be economically meaningful, they should together approximate economic depreciation. That is, the change in the value of embedded assets that results from *both* asset revaluation and annual depreciation charges should approximate economic depreciation.

Depreciation Rates

7.1 The Office examined the reasonableness of C&WJ's past depreciation rates, with a view to determining the approach that should be adopted going forward. In 1997/98 C&WJ's depreciation expense was 5.3% of gross plant. Comparisons were made with comparable plants internationally and adjustments were made for peculiarities. Based on the benchmark comparisons, general publications, and information supplied by C&WJ itself the Office took the position that C&WJ's rate of depreciation was low compared with international practice and that this was part of the reason the Company's net asset were in excess of their economic value. Notably, the international trend is for higher rates of depreciation in order to ensure MEA values.

7.2 As previously indicated herein, the Office has determined that the valuation of C&WJ's capital for regulatory purposes should equal the economic value of the plant. This means that the value of net plant should equal the economic value of gross capital less accumulated economic depreciation. Accumulated depreciation in this context equals the difference between the economic value of new MEAs and older embedded plant. That difference reflects, in part, physical wearing out of the equipment but a more important consideration for telecommunications plant is that older plant does not embody the latest technology. Older plant may not have the full functional capability of MEAs or may require costly software upgrades to have that capability. Also, older plant may have a shorter remaining economic life.

7.3 The calculation of depreciation expense reflects certain views on the rate of technological obsolescence. The same views should be taken with regard to the calculation of accumulated depreciation. A view that technological obsolescence is more rapid, leads to a lower capital valuation (which lowers estimated costs) but higher depreciation expense (which raises estimated costs). A view that technological obsolescence is less rapid has the opposite effects.

7.4 The Office has long understood that C&WJ's historical depreciation has been too low to adequately reflect technological obsolescence and its downward effects on asset values. C&WJ's net asset values must therefore be adjusted to be consistent with these estimates of economic depreciation. In particular, the Office has determined that separate rates should be applied depending on the method of revaluation used.

Absolute Valuation

7.5 For assets that C&WJ has valued on the basis of bottom-up MEA studies, the historical depreciation rates will continue to be used to calculate accumulated economic depreciation and the value of net plant. The lower historical rates are reasonable for assets valued on the basis of the Absolute Valuation because they already reflect the effects of technological obsolescence.

Determination 6.1: The Office has determined that it is appropriate to use the historical depreciation values to calculate the net values of assets the values of which have been determined using absolute valuation.

Turner Indexation

7.6 For assets that C&WJ has valued on the basis of the Turner indices, C&WJ's proposed depreciation rates will be used to calculate accumulated economic depreciation and the value of net plant. Algebraically the adjustment is as follows:

$$n_a \; ? \; n_u \; ? \; (g_u \; ? \; n_u)(\frac{d_p}{d_h} \; ? \; 1)$$

where

n = net-asset value;
g = gross-asset value;
d = depreciation expense;
subscript *u* denotes unadjusted;
subscript *a* denotes adjusted;
subscript *p* denotes proposed (by C&WJ); and
subscript *h* denotes historical.

7.7 The depreciation rates used for assets that are subject to absolute valuation are not, however, reasonable for assets that are valued on the basis of Turner indices. Turner indices reflect reproduction cost, not cost of replacement with MEAs. That is, the Turner indices do not reflect technological obsolescence. Thus, in conjunction with the Turner indices, it is appropriate to use a measure of depreciation that reflects the entire decline in economic value.

7.8 The Office emphasizes that economic values of plant are completely independent of the accounting practices that C&WJ used in the past. Those rates were part of a broad-ranging general agreement between C&WJ, formerly, TOJ and the Government of Jamaica and were reflected in the All Island Telephone Licence of 1988. That agreement included *inter alia* low depreciation rates but quite a high return to capital.

7.9 C&WJ has proposed a particular set of higher depreciation rates to use in the future. Those rates are shown in Annex III. Motor vehicles and special purpose vehicles are not owned by the company but are leased. The rates of 22.55% are applied to the value of the long-term leases. The Office believes that these rates are reasonable estimates of economic depreciation. These rates will therefore be used in calculating cost oriented rates for Reference Interconnection Offer (RIO) 5 and subsequent RIOs. The same rates will be used in making revisions to C&WJ Price-Cap Plan.

Determination 6.1: The Office has determined that for assets that C&WJ has valued on the basis of the Turner index, the new depreciation rates proposed by C&WJ will be used to calculate accumulated economic depreciation and the value of net plant. This must be done using the algebraic formula set out above. These rates are set out at Annex III). It is further determined that these rates are to be used in calculating cost-oriented rates for Reference Interconnect Offer (RIO) 5, subsequent RIOs and in making revisions to C&WJ's Price Cap Plan.

CHAPTER 8: Asset Base for Regulatory Purposes

8.0 During the analysis, the Office calculated asset values and costs for 2000/2001. The Office regards that the valuation of the capital stock, the real cost of capital and economic depreciation must all be considered together. The major adjustments to C&WJ's asset values have been in made in the following areas:-

* volume discounts;
* Interest During Construction;
* Loadings for duty, insurance and freight; and
* Spare capacity.

Economic Deprecation

8.1 The calculation for economic depreciation depends on the fractional value of assets that were determined by MEA calculations versus those determined through Turner Indices. The economic depreciation rate for each category is a weighted average based on this fraction. For assets values determined through MEA, the 2000-2001-depreciation rate is used. For the fraction based on Turner Indices, C&WJ's proposed depreciation rate is used. Since the 2001 NBV were based on the 2000-01 depreciation rates, which were the historical rate, an adjustment to the net plant is needed to account for the new depreciation rates used. This adjustment is the ratio of the depreciation rates less unity multiplied by difference between gross and net book values.

Terminal Equipment

8.2 Since terminal equipment is excluded from the book values, work in progress relating to terminal equipment is subtracted out. The final asset values (gross book value and net book value) are the pre-adjusted totals, subtracting out the adjustments for terminal equipment and the adjustments for economic depreciation in the case of net book value.

Real Cost of Capital

8.3 The cost of capital is another important component of determining asset valuation. In particular, there is need to ensure that the valuation method is consistent with the cost of capital that is applied. The cost of capital is of course the rate of return necessary to attract investment. It constitutes a sizable portion of C&WJ's total costs. In order to determine the appropriate cost of capital to be applied to C&WJ, the Office commissioned Charles River Associates ("CRA") to

conduct a study of cost of capital. The results of that study were presented to the Office in May 2000.[3]

[3] Bradford Cornell, *Estimate of the Weighted Average Cost of Capital for Cable & Wireless Jamaica Limited*, Charles River Associates (14 May 2000).

CHAPTER 9: Asset Valuation for Future Years

9.0 The determinations of the Office with regard to the valuation of assets for regulatory purposes for future years are set out below.

Determination 9.0: For financial year 2000/2001, the values of Gross and Net Plant (for existing assets) were calculated for as described in this Notice. In 2001/2002 and subsequent years until new specific studies are done, the U.S. Turner Index, adjusted for exchange rate changes, may be used to revalue existing assets for regulatory purposes.

Determination 9.1: With regard to new plants, it is determined that Equipment that is added during the year under consideration must be included in the capital stock at cost, with the following provisos:-

- *Interest During Construction (IDC)* -If interest during construction has been applied to the assets under consideration when they entered the Fixed Asset Register, then the interest charges must be removed, as is determined above. For example, if interest was added at the rate of 2%, then the value of the assets must be divided by 1.02.

- NETWORK PLANNING COSTS - If Network Planning Costs have been capitalized according to earlier practice (such as at an overall rate of 36%) then the capital must be modified by shifting some Network Planning from central office equipment to outside plant, and some from capital to expense, as was specified in our Notice of June 13, 2002.

- RETIREMENTS - The Gross Plant amount must be reduced by the adjusted cost of plant that is retired during the year. Net Plant must be reduced by the adjusted value of the plant less accumulated depreciation. The depreciation reserve is to be reduced by the accumulated depreciation associated with the retired plant.

-DETERMINATION OF NET PLANT - Net Plant is to be determined by calculating depreciation expense on existing, using plant proposed rates, and subtracting it from the Gross Plant valuations.

-*WORK IN PROGRESS (WIP)* - WIP is to be valued at cost and added directly to both gross and net plant valuations. It is not depreciated and retains full value until it enters the registered assets (and is then no longer part of WIP).

-SWITCHING EQUIPMENT CAPACITY ADJUSTMENT - Each year, existing values of switching plant (both gross and net), which have been adjusted downward for spare capacity, may be increased as lines in service increase. In particular, the increase in gross switching asset values shall be 0.8198 times the percentage increase in lines in service (until lines in service reach 585,359) times the 2001-2002 gross asset switching value, adjusted for retirements and by the Turner indices, as described above. The same procedure should be used for net plant, but depreciation expense must be subtracted out, as described above.

GLOSSARY of Abbrevations

BCPM: Benchmark Cost Proxy Model

BBSTP: Broadband Signalling Transfer Point

CCA: Current Cost Accounting

DMS Digital Multiplex Switch

DRSC-S: Dual Remote Switching Centre – SONET (Synchronous Optical Network)

GSP: Global Service Platform

GRC: Gross Replacement Cost

HCA: Historical Cost Accounting

HCPM: Hybrid Cost Proxy Model

HAI: Hatfield Associate Incorporated

ILECs: Incumbent Local Exchange Carriers

MEA: Modern Equivalent Asset

NRC: Net Replacement Cost

NTT: Nippon Telephone and Telegraph

OPAC: Outside Plant Access Cabinet (otherwise known as Outside Plant Module)

OSC: Operator Services Centre

Oftel: Office of Telecommunications Regulation (UK's telecommunications regulatory body)

PSTN : Public Switched Telephone Network

RSC: Remote Switching Centre

Rate of Return (ROR)

RSC-S: Remote Switching Centre - SONET

RLCM: Remote Line Concentrator Module

TELRIC: Total Element Long Run Incremental Cost

TOPS: Traffic Operator Position System

Annex I: Schedule 1 - All Island Telephone Licence

Plant Category	Depreciation Rates %
Telephone Exchange (Central Office) Equipment: (i)Telephone Exchange (Central Office) or telex exchange (ii)Radio, carrier and transmission equipment	 4.5% 6.5%
Station Apparatus (i) Station apparatus excluding private branch exchanges, mobile radio units and tele-printers (telewriters) (ii) Station connections (iii) Private branch exchanges (iv) Mobile radio equipment (v) Teleprinter equipment	 6.5 10.0 8.0 22.5 22.5
Main Line and Distribution Plant (i) Pole Lines (ii) Aerial cable (iii) Underground cable (iv) Buried cable (v) Submarine cable (vi) Aerial wire (vii) Underground conduit	 5.00 6.25 2.80 5.50 8.00 5.50 2.00

Annex II: Fixed Assets Register

Asset Class	Asset Description	MEA Study
21110	Land	Market Value
21120	Motor Vehicle	Leased
21140	Special Purpose Vehicles	Leased
21161	Work Equipment	Market Value
21162	Test Equipment	Market Value
21163	Training School Equipment	Market Value
21210	Buildings	Valuation by Goldson Barrett Johnson
21220	Furniture	
21231	Office Support Equipment	
21240	General Purpose Computers	
22120	C.O. Switching	✍
22200	C. O. Operator Systems	
22311	Satellite & Earth Station	✍
22312	C.O. Transmission	✍
22322	C.O. Telex	
23120	Station Apparatus- Small PABX/PBX	
23130	Station Apparatus- Telex	
23140	Station Apparatus – MRE	
23150	Station Apparatus – General	
23210	Station Connection	
23410	Large PABX/PBX	
23510	Public Telephone	
24110	Poles	✍
24211	Metallic Aerial Cable	✍
24212	Non-Metallic Aerial Cable	✍
24221	Metallic Underground Cable	✍
24222	Non-Metallic Underground Cable	✍
24241	Metallic Submarine Cable	✍
24242	Non-Metallic Submarine Cable	✍

Asset Class	Asset Description	MEA Study
24310	Aerial Wire	
24410	Underground Conduit	✍

v indicate assets subject to MEA Valuation

Annex III: Depreciation Rates and Asset Lives

Description	Old Depreciation Rates, 1988-2001	New Depreciation Rates October 2002
Land	-	-
Motor Vehicles	22.5	22.5
Special Purpose Vehicles	22.5	22.5
Work Equipment	9.50	22.5
Test Equipment	9.50	12.5
Training School Equipment	9.50	12.5
Buildings	2.0	2.5
Furniture	9.50	10
Office Support Equipment	9.50	10
General Purpose Computers	9.50	20
C.O Switching	4.5	6.67
C.O Operator Systems	4.5	6.67
Satellite and Earth Stations	6.5	6.5
C. O Transmission	6.50	6.5
C. O. Telex	4.5	12.5
Station Apparatus – Small PBX/PABX	8.0	N/A
Station Apparatus – Telex	6.50	N/A

Description	Old Depreciation Rates, 1988-2001	New Depreciation Rates October 2002
Station Apparatus – MRE	22.5	N/A
Station Apparatus - General	6.50	N/A
Station Connection	10	N/A
Large PBX/PABX	8.0	N/A
Public Telephone	6.50	6.67
Poles	5.0	5
Metallic Aerial Cable	6.25	6.25
Non-Metallic Aerial Cable	6.25	6.25
Metallic Underground Cable	2.8	5
Non-Metallic Underground Cable	2.80	5
Metallic Submarine Cable	8	8
Non-Metallic Submarine Cable	8	6.67
Aerial Wire	5.5	6.25
Underground Conduit	2	2.5
Plant Held for Future Use	2.78	