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RGL Forensics
Discovering & Defining Financial Value

Final Report for ComReg

Review of *eircom*'s regulatory asset lives

16 February 2009

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1.1.2. Depreciation and the cost of capital associated with the financing of fixed assets represent a significant cost in telecoms and are therefore important in calculating regulated cost-based prices. In calculating depreciation charges, a key factor is the assumed life of the asset. If the assumed life is too short, there is a risk that depreciation and resulting prices will be too high relative to the levels required under cost-orientation obligations. If the assumed life is too long, there is a risk that depreciation and corresponding prices would be set below the levels required to ensure adequate cost recovery, which may adversely affect the ability and willingness to undertake future investment in networks and services.

1.2. Economic and accounting depreciation methodologies

1.2.1. Economic depreciation provides a framework for the calculation of a theoretically optimal allocation of the costs of fixed assets across their useful lives. However, the calculation of economic depreciation in practice is not straightforward and requires the use of subjective data on future demand, technology and costs.

1.2.2. The alternative to economic depreciation – accounting depreciation – requires much less effort to compute, and under certain circumstances will give a good approximation to an economic approach to calculating depreciation. In principle, however, the asset lives used under economic and accounting approaches to depreciation should be the same.

1.2.3. For regulatory accounting purposes, a true economic approach to the calculation of depreciation is not feasible as the information and computational requirements would be too great. Regulatory accounts therefore always apply an accounting approach to depreciation, and this will help provide a first order assessment of the underlying economic cost of different services.

1.2.4. However, for a one-off review or in setting prices for individual services, it may be preferable to use an economic approach to calculating depreciation. The decision of whether or not to use an economic approach should take into account a number of factors including:

- the likelihood of it generating a materially different allocation of costs over time.
- the primary regulatory objective (e.g. price-setting, promotion of investment, or stimulation of competition).
- the size of the potential difference between an accounting and economic approach (which in turn may depend on a number of factors including: pace of technological change, future cost profiles, and expected demand).

1.3. Differences between statutory and regulatory accounts

1.3.1. Eircom currently applies different useful economic lives for a number of assets in determining depreciation in its statutory and regulatory accounts. It is unusual for the two sets of accounts to apply different useful economic lives. In eircom's case, this has resulted from a direction (in 2001) from the regulator to revert to pre-privatisation asset lives (thereby deviating from those being used by the company's new owners in its statutory accounts since 1998/99).

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1.4. RGL's assessment of the lives of eircom's major asset categories

1.4.1. Useful economic lives shown in eircom's regulatory and statutory accounts are provided for major categories only. In practice, eircom applies different lives to a larger number of categories. These are set out in Annex II (Table 33) at the end of this Report

1.4.2. The lives for the key asset categories that eircom was directed by the regulator to use in its regulatory accounts from 2001 onwards and RGL's recommended lives for use in the future are set out in *Table 1* below.

Table 1 Key asset categories - Recommended Useful Economic Lives

Asset category	Current useful Life Regulatory Accounts	RGL's Recommended Useful Life
Land	Not depreciated	Not depreciated
Buildings	40	40
Ducts and associated civil works	20	40
Underground Copper cable	14	20
Overhead copper cable	10	15
Exchange line terminations	8	8
SDH equipment	6	6
Poles	8 and 15	30
Software	3-4	5
Vehicles	4-5	6

1.4.3. In RGL's view the asset lives used to calculate depreciation in the regulatory accounts for a number of the basic infrastructure of eircom's network are too short. In particular, lives for ducts, copper cable and poles are below what we believe to be a reasonable estimate of the useful economic life for those assets.

1.5. Ducts and associated civil works

1.5.1. Eircom's regulatory accounts depreciate duct and associated civil works over 20 years. In practice, many of these assets have been in place, and continue to be used, for significantly longer.

1.5.2. From a technical perspective the ducts can be expected to last for 50 years or more. The introduction of next generation access networks will require the use of ducting, and in most cases we would expect that current ducting could be reused.

1.5.3. We have not identified any evidence which would suggest the ducts in Ireland would be expected to have a shorter life than in other countries. Research[1] on assumed economic life for ducts adopted by other fixed line operators, regulators and UK local authorities indicates an asset life in the region of 40 years - our recommended life.

[1] Annual Local Authority Road Maintenance (ALARM) Survey, 2000

1.6. Underground and overhead copper cable

1.6.1. Eircom's regulatory accounts depreciate underground copper cable over 14 years and overhead copper cable over 8 to 10 years. In practice, many of these assets have been in place, and continue to be used, for significantly longer.

1.6.2. From a technical perspective, copper wire should last for at least 25 years and fibre can be expected to last for a similar period. We have not identified any evidence which would indicate or suggest the copper local loop in Ireland would last any less than in other countries.

1.6.3. Whilst the move towards next generation access technologies may see some copper in the network being replaced with fibre, eircom is still investing in copper based technologies (such as ADSL) to deliver residential broadband services.

1.6.4. We therefore recommend an increase in the assumed life for copper and fibre cables; for underground to 20 years and overhead to 15 years.

1.7. Poles

1.7.1. Eircom's regulatory accounts depreciate telegraph poles over 8 years in the trunk network and 15 years in the access network. In practice many of these assets have been in place, and continue to be used, for significantly longer.

1.7.2. From a technical perspective, poles can be expected to have a useful working life of 50 years or more, provided they are properly maintained. We have not identified any evidence which would indicate that poles in Ireland would be expected to have a shorter life than in countries with similar weather conditions.

1.7.3. Research on assumed economic lives suggests that at least 30 years for telecoms poles would be reasonable. We therefore recommend an increase in the asset life of poles to 30 years.

1.8. Vehicles

1.8.1. Eircom's regulatory accounts depreciate vehicles over 4-5 years. Eircom's fixed asset register includes a significant number of vehicles which are fully depreciated but which appear to still be in use. This would suggest that the current assumed useful economic lives are too short and we therefore recommend a life of 6 years.

2. Introduction

2.1. Introduction

2.1.1. This report sets out RGL's review of the asset lives that should be used by eircom in calculating depreciation costs in its regulatory accounts.

2.2. Report overview

2.2.1. Depreciation represents a significant cost in telecoms (typically 10-15 per cent of revenues). We have reviewed the relevant literature on the use of economic depreciation in regulation and set out why a financial accounting approach to calculating depreciation may or may not yield the necessary economic costs that would be used in a regulatory or competition analysis.

2.2.2. In undertaking the review, we have prepared a hierarchical approach to the assessment of the asset lives that we believe are appropriate for use by ComReg in regulating eircom's regulated prices. 13 asset categories have been defined and analysed, using sub-categories where appropriate, to derive recommended useful economic lives.

2.2.3. In making our recommendations we have taken into account international benchmarks, technological factors, market developments and factors specific to eircom.

2.3. Report Structure

2.3.1. The remainder of this report is structured as follows:

- Section 3 discusses how asset lives are used to calculate depreciation in regulatory and statutory accounts.
- Section 4 sets out the background to eircom's current depreciation policy.
- Section 5 sets out our recommended categories of assets together with our recommended useful economic lives for those categories.
- Annex I provides further details of the literature relating to economic depreciation.
- Annex II sets out the recommended regulatory useful economic lives applicable to asset major categories.

3. Depreciation – theory and practice

3.1. Introduction

3.1.1. Assumptions about the useful economic lives of assets are important in the practical determination of the depreciation allowances used to determine regulated cost-based prices of (wholesale and retail) telecommunications services. However, in order to understand the precise role of those assumptions, it is necessary to consider in more detail the key issues for regulatory policy and practice on depreciation. That is the subject of this Section of the Report.

3.1.2. The Section is structured as follows:

- Section 3.2 considers the importance of depreciation in the wider regulatory context;
- Section 3.3 examines the differences between economic and accounting concepts of depreciation;
- Sections 3.4 and 3.5 consider, respectively, the application of the theory of economic depreciation and the calculation of economic depreciation in practice in European telecommunications;
- Sections 3.6 to 3.8 examine how depreciation has been considered in the context of regulatory reporting and the determination of charges in the telecommunications industry, especially in the context of bottom-up vs. top-down cost modelling;
- Section 3.9 considers how depreciation is addressed in the accounting standards and their application by eircom in the preparation of statutory accounts;
- Section 3.10 looks briefly at eircom's depreciation policy, as applied in its statutory and regulatory accounts;
- Sections 3.11 examines the practice of estimating the useful economic lives of assets in practice;
- Sections 3.12 examine another key issue, namely technological obsolescence and the regulatory treatment of stranded assets; and
- Section 3.13 concludes.

3.2. The importance of depreciation in telecoms

3.2.1. The costs of fixed assets make up a large proportion of the total costs of a telecoms operator. Typically, in the region of 11 to 15 per cent of revenues of a fixed line operator will be spent on fixed assets each year. Table 2 shows the annual fixed asset expenditures expressed as a percentage of revenues of eircom (for 2005 to 2008), BT (2006 to 2008) and France Telecom (for 2006).

Table 2: Annual investment as a proportion of revenues for three European incumbents

Company	Accounting periods	Additions / Revenue
BT PLC	2006-2008	12-15%
France Telecom*	2006	13-14%
Eircom **	2005 - 2008	11% - 15%
Range		**11% - 15%**

Source: annual reports

- *France Telecom's fixed asset additions may include some element of intangible fixed assets.*
- *Eircom's fixed asset additions also include investment in Meteors mobile network from 2007.*

3.2.2. However, telecommunications assets, as well as constituting significant proportions of operators' total costs, also tend to be very long-lived. Investment in these assets requires significant up-front capital (debt or equity) injections. Investors who provide this capital expect a reasonable reward for the risks assumed in providing the funds, as well as the funds themselves eventually. These investor expectations translate into costs for the company.

3.2.3. Private companies reflect these costs through (i) their depreciation policies which are influenced by investors' required returns *of* capital and (ii) their target internal rate of return (IRR) which, under perfectly competitive conditions, can be expected to equal investors' required returns *on* capital (their reward for the risks taken).

3.2.4. Economic regulation, in seeking to emulate the workings of competitive markets through price controls[3], seeks to provide appropriate allowances for the capital costs that could be expected to be incurred in the provision of equivalent services by a hypothetical efficient new entrant. That implies capital cost allowances in regulated prices for:

- Depreciation that reflects the current real cost of the network assets required to provide efficient wholesale and retail services; and
- Allowed rates of return which are set equal to the company's estimated weighted average cost of capital (WACC).

[3] And other restrictions on the conduct of regulated firms.

3.2.5. As already noted, depreciation allowances are the subject of the following subsections. As well as assumptions about the useful economic lives of assets, policies relating to the profile of depreciation over time and the assumed basis for asset valuation are also important.[4]

3.2.6. Policy on WACC and allowed rates of return is beyond the scope of this Report. Suffice it to note that assumptions about the useful economic lives of assets impact monetary returns on investment because the longer the assumed lives of assets, the longer the capital funds used to purchase those assets remain in the business and the longer investors are entitled to a return on those funds.

3.2.7. The importance of policies on depreciation can be considered in terms of regulatory objectives, especially in the area of promoting or providing incentives for efficient investment. If investors perceive a risk that their funds might not be recouped or that the return of their funds might be deferred, they may be less willing to provide the necessary investment or may only be willing to provide it at a higher cost. This would impact on the willingness of the company to undertake future investment.

3.2.8. Such perceptions of risk usually arise from time inconsistency in regulation, when the costs and prices of services that employ long-lived assets are periodically re-determined. For example, the regulator might adopt different approaches to the valuation of assets over time, or the regulator might continually change assumptions about the useful economic lives of assets. However, such practice should be distinguished from changes that are the result of periodic reviews of the appropriateness of current assumptions about asset lives. We believe that such changes are normal and to be expected and, therefore, we also believe it to be entirely reasonable for ComReg to review the asset lives being used by eircom in its regulatory accounting, which in turn forms the basis for regulated prices.

3.2.9. Perceptions of high risk might also occur if the pace of technological change and the risk of technological obsolescence is such that prices set to reflect more recent and efficient technology leave the regulated operator with higher priced older ‘stranded assets’ for which it cannot recover its costs. (See Section 3.12 below for further treatment of the issue of technological obsolescence.)

3.2.10. However, the treatment of depreciation is also important in supporting other regulatory objectives like delivering benefits to consumers through cost-orientated charges, promoting competition and ensuring that operators have the opportunity to recover efficiently incurred costs, thereby supporting efficient and sustainable operations into the future.

3.3. Economic vs. accounting depreciation

3.3.1. In considering the use of depreciation in regulatory accounts it is useful to consider two approaches to calculating depreciation - economic depreciation and accounting depreciation.

3.3.2. Economic depreciation can be defined as the decline in the market value of an asset over a particular period of time.[5] In a stable, competitive market, the market

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[4] The issue of asset valuation generally boils down to a choice between historic cost and current cost accounting. Current cost accounting is implemented either under operational capital maintenance (OCM) or financial capital maintenance (FCM) frameworks. OCM is designed to ensure that sufficient amounts of revenues are set aside through depreciation charges in the profit and loss account to replace assets. FCM considers depreciation in terms of recovering the original funds invested.

[5] This was first considered in Hotelling (1925), “A General Mathematics Theory of Depreciation”, *Journal of the American Statistical Association*

value of assets will be related to the asset's earning power, which can be measured as the net (discounted) present value (NPV) of the future stream of income accruing to the asset, where net income means revenues from output less operating costs.[6]

3.3.3. Where asset prices are stable, economic depreciation will generally result in a higher allocation of costs in periods where the asset is fully utilised (and therefore generating higher revenues and profits) than in periods where it is not. The calculation of economic depreciation therefore usually requires a forward-looking estimate of the future use of the asset – including the output and revenues as well as the operating costs of the asset.

3.3.4. In an economic depreciation calculation, the economic life of an asset is the period of time over which it has a positive economic value. In each period some of the value of the asset is consumed until the end of its economic life when it is retired due to any number of reasons that might include wear and tear, obsolescence, inadequacy, demand shifts or changes in the requirements of regulators.

3.3.5. In a regulatory context, economic depreciation refers to the economic cost of consumption of the asset for use in a pricing calculation. Economic depreciation is also the most theoretically correct for calculating costs when assessing prices in a competition analysis. For example, the UK's Competition Commission, in its inquiry on mobile termination, concluded:

> "In our view economic depreciation is the appropriate method to use because it most accurately matches the costs incurred in order to carry traffic to the periods in which that traffic is carried."[7]

3.3.6. In its decision, the Competition Commission noted that the approach used by Ofcom (then Oftel) for its LRIC model was economic depreciation, which "matches the cost of equipment to its actual and forecast usage over the long term". It was also noted that the timing of cost recovery under economic depreciation varied from that under accounting depreciation, adding between 0.62p and 2.4p per minute to the cost of terminating calls between 2001 and 2006. However, prior to 2001, economic depreciation would have resulted in lower pence per minute costs, compared to a calculation based on accounting straight-line depreciation.

3.3.7. Accounting depreciation refers to the calculation of depreciation used in the preparation of financial accounts, as prescribed by the relevant accounting standards.

3.3.8. In principle, the accounting definition of depreciation is very similar to an economic approach. For example, the accounting standard FRS 15 defines depreciation as:

> "The measure of the cost or revalue amount of the economic benefits of the tangible fixed asset that have been consumed during the period.
>
> Consumption includes the wearing out, using up or other reduction in the useful economic life of a tangible fixed asset whether arising from use, effluxion of time or obsolescence through either changes in technology or demand for the goods and services produced by the asset."[8]

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[6] By virtue of that fact, the remaining positive value at any point in time (that is, the purchase cost of the asset less economic depreciation) should be what a rational investor would be willing to pay to acquire the asset in a second-hand market.
[7] Competition Commission in Vodafone, O2, Orange and T-Mobile, December 2002 para 2.283
[8] FRS 15 Tangible Fixed Assets

3.3.9. However, in practice, the accounting or cost concept of depreciation tends to recognise the cost of assets as a prepaid expense, which is systematically allocated to accounting periods during the assets' expected or estimated useful economic lives. The amount allocated to any one accounting period does not necessarily represent the loss or decrease in value which occurred during that particular period.

3.3.10. Accounting depreciation typically involves the use of a relatively simple rule for allocating the cost of an asset over time. The most often used rules are straight-line depreciation (where the same percentage of the gross cost of the asset is allocated to each period) and the declining balance depreciation (where the same percentage is applied to the written-down value remaining in each year).

3.3.11. Whilst accounting depreciation calculations could, in principle, adopt the more theoretically robust approach, they tend not to for two main reasons.

3.3.12. Firstly, economic depreciation calculations require the quantification of future revenues and costs associated with the asset (or group of assets). The estimates needed to make these calculations are inherently difficult and subject to forecasting error, uncertainty and involve constant revision. A fundamental principle applied in accounting is that of prudence which requires that:

> "(a) expenditure …that cannot justifiably be shown to be associated with…future economic benefits will be recognised in the performance statement as a loss in the period in which it is incurred; and
>
> (b) expenditure incurred with a view to future economic benefits but whose relationship to such benefits is too uncertain to warrant recognition of an asset will be recognised immediately as a loss".[9]

3.3.13. So, for example, the use of a greater depreciation charge in future periods because of, say, assumed increased revenues, which would be required under an economic approach, might be insufficiently certain to be justified in an accounting approach.

3.3.14. Secondly, the amount of work required to generate the information needed to establish robust economic depreciation calculations can be difficult and costly to compile and, in many cases, simple rules of thumb (such as straight-line and reducing balance) may yield very similar results.

3.3.15. In discussing the difference between economic and accounting depreciation, accounting depreciation is often referred to as an exercise in cost allocation (allocating the cost of an asset over time), whereas economic depreciation is concerned with matching the annualised cost of the asset with the economic value of the asset consumed in providing services in that year.

[9] Statement of Principles for Financial Reporting Accounting Standards Board 1999 para 5.32

3.4. Application of the theory of economic depreciation

Measurement issues

3.4.1. The feasibility of applying Hotelling's model of economic depreciation is determined by the feasibility of estimating its parameters. Measuring true economic depreciation requires knowledge of at least the projected revenues to be generated by the asset and the operating costs associated with it, but also the alternative cash flows associated with technologically superior next generation assets that reduce the useful economic lives of older vintage assets.[10]

3.4.2. In respect of operating costs, there is a circularity issue, namely that operating costs always include elements that depend on the value of the asset, but finding the value of the asset requires knowledge of operating costs.[11] Hotelling (1925) assumed that the dependence between operating costs and asset value is normally a linear one to accommodate the idea that taxes and insurance premia are directly proportional to the value of the asset.

3.4.3. Hicks (1973)[12] suggested that the starting point is the market value of in-use assets and posed the question of whether this can be measured. If not, he asserts, used-asset market values might be employed. In that regard, Hardin et al. (1999) note Akerlof's (1970) point that assets resold in second-hand markets are not representative of the underlying population of assets because only poorer quality units are sold while they are still usable. However, Hardin et al. also note the opposing view that assets aren't necessarily always sold because of asset quality, but because of events such as plant closings, shifts in product demand, or decisions related to tax optimisation, inventory control or liquidity requirements.

3.4.4. Hardin et al. (1999) note that estimates of market values are often only speculative and subject to manipulation while Hulten and Wykoff (1996) explain the problems of estimating economic depreciation in terms of the thinness of resale markets, their sporadic nature and their dominance by dealers who consistently underbid.

Empirical studies of economic depreciation

3.4.5. Much of the economic literature is concerned with predicting the circumstances under which particular methods of accounting depreciation are valid in economic terms. Hotelling (1925), for instance, examined the straight-line, declining balance and sinking fund methods and concluded that they all:

> "…depend for their validity upon the satisfaction of conditions which are so special that the chances are overwhelmingly against the satisfaction of any of them in a particular case".

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[10] See Hardin, A., H. Ergas & J. Small (1999), "Economic Depreciation in Telecommunications Cost Models", presented at 1999 Industry Economics Conference, July, Melbourne.
[11] This is because operating costs must be subtracted from the future stream of income from the asset in order to arrive at a NPV valuation.
[12] Hicks, J. (1973), *Capital and Time: A Neo-Austrian Theory*, Clarendon Press, Oxford.

Economic depreciation and efficiency

3.4.6. Kim & Moore (1988)[13] introduced a behavioural model to examine depreciation in terms of a producer's cost-minimisation programme. Costs are minimised through optimal asset maintenance and utilisation policies, as well as an optimal ratio of capital assets to other inputs, given input prices and an output constraint.[14]

3.4.7. In respect of asset lives, Kim and Moore (1988) noted that, by setting the value of an asset equal to the market value at which it is to be replaced, Hotelling's model could be used to determine the useful life that is consistent with economic depreciation.

3.5. Calculating economic depreciation in European telecommunications

3.5.1. The European Commission[15] and most national telecommunications regulators generally recommend the use of forward-looking long run incremental costs (FL-LRIC[16]) as the basis for setting regulated prices (that are cost-orientated).

3.5.2. The 'long run' in FL-LRIC means a time horizon in which all costs can be considered variable, including capital investment or divestment to increase or decrease the capacity of existing productive assets.

3.5.3. In being 'forward-looking', the cost base should reflect, according to the Independent Regulators Group (IRG), "only the costs necessary for maintaining future real asset values in a competitive market".[17] This is because, in a competitive environment,

> "Operators may not be able to set the price for every product in order to fully recover its incurred or historic cost, since they have to respond to market prices, which can often lie well below historic costs".

This implies that

> "the basis for asset valuation is the replacement cost of an asset as derived from the application of current cost accounting (CCA) methodologies".[18]

3.5.4. The IRG goes on to state that

> "In practice, the concept of forward-looking costs requires that assets are valued using the cost of replacement with the modern equivalent asset (MEA). The MEA is the lowest cost asset, providing at least equivalent functionality and output as the asset being valued. The MEA will generally incorporate the latest available and

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[13] Kim, M. and G. Moore (1988), "Economic vs. Accounting Depreciation", *Journal of Accounting and Economics*, 10

[14] Optimal conditions were found to equate: (i) the marginal cost of increased utilisation (in the form of faster decay) with the marginal benefit from higher output; (ii) the marginal cost of maintenance with the marginal benefit of increased maintenance activity (in the form of slower decay); and (iii) the user contribution to overall capital costs with the marginal productivity of capital.

[15] Recommendation 98/195/EC of 8 January 1998 on interconnection in a liberalised telecommunications market

[16] Note that LRAIC was the term used by the European Commission when the increment was defined in terms of total service, while LRIC was/is commonly used when the increment was defined in terms of discrete products/services.

[17] Principles of implementation and best practice regarding FL-LRIC cost modelling as decided by the Independent Regulators Group, 24 November 2000.

[18] See footnote 17.

proven technology, and will therefore be the asset that a new entrant might be expected to employ".[19]

3.5.5. In practice, two approaches can be taken to calculating these costs: (i) detailed bottom-up modelling; and (ii) top-down models calculated from the operator's regulatory accounts.

3.5.6. Bottom-up models are typically designed to calculate the investment costs of building efficient networks, which are then annualised to yield annual allowed capital costs. They also incorporate operating costs, which will closely reflect forward-looking asset maintenance requirements.

3.5.7. Bottom-up models are likely to be used where:

- the regulator is particularly concerned with setting prices that reflect forward looking efficient investment (as opposed to the historic costs of legacy assets);
- where there is no relevant information from the regulatory accounts (for example in the case of a new service); and
- where the information from the regulatory accounts is insufficiently detailed or reliable.

3.5.8. Top-down models have the advantage of being derived from verifiable, actual costs. They might, consequently, be considered more robust, and less dependent on subjective assumptions and forecasting errors. However, they tend to be more 'backward-looking' and are, therefore, less likely to form an adequate basis for efficient pricing.

3.5.9. Wherever possible, results from a bottom-up model should be reconciled with any top-down information that is available.[20] This was a feature of the Mannesman Arcor case in Germany. Deutsche Telecom had sought authorisation of one-off and monthly charges for unbundled access to its local loop that were calculated on the basis of a "traditional" cost accounting system. However, these proposals were rejected by the regulator, which based its lower authorised charges on a bottom-up model developed by consultants, and which sought to identify the long-run incremental costs of unbundling.[21]

3.5.10. As outlined by Europe Economics, the case was interesting for a number of reasons, including:

- the charges authorised by the German regulator (RegTP) and the ones submitted by Deutsche Telecom were calculated on the basis of the same information (from Deutsche Telecom's accounts) and the same methodology, which, given the difference between the two sets of charges, suggests that there is a substantial level of judgement involved in deriving cost estimates;
- a benchmarking exercise was considered by the German regulator as a useful cross-check on the bottom-up model as well as on the incumbent's submissions and pricing proposals.

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[19] *Ibid*

[20] The importance of reconciling regulatory cost calculations to the company's financial results was highlighted by the UK's Competition Appeals Tribunal in Claymore. "Whichever approach [bottom-up or top-down], sufficient cross-checks should be made to ensure that any cost information supplied by a company under investigation is capable of being reconciled back to its management or statutory accounts." See paragraph 228.

[21] See "Pricing Methodologies for Unbundled Access to the Local Loop", Europe Economics, May 2004. Available at http://ec.europa.eu/competition/liberalization/pricing_open_loop.pdf. Note that, subsequently, the European Commission levied a substantial fine on Deutsche Telecom for unfair pricing (price squeeze) of unbundled local loop access contrary to Article 82(a) of the Treaty of Rome.

3.6. Depreciation in bottom-up LRIC models

3.6.1. The IRG Guidelines further state that, in the context of FL-LRIC cost modelling, depreciation should reflect "an annualised cost for consumption of capital assets" and that these annualised costs should, in turn, be calculated on the basis of economic depreciation.[22]

An example of economic depreciation - Oftel

3.6.2. A useful example of the practical application of economic depreciation is provided by Oftel's cost modelling, used to form the basis of regulated termination charges for calls to mobile phones.[23]

3.6.3. As well as the discount rate (equal to the cost of capital), the important variables considered by Oftel in determining economic depreciation included:[24]

- Changes in operating costs over time (for a given asset over time and between different asset vintages purchased in different years). If operating costs increase with the age of the asset (increasing maintenance costs due to wear and tear), the more that cost recovery through depreciation needs to be brought forward.
- Future changes in the price of assets. If they are expected to fall over time, the more depreciation needs to be front-loaded to enable the incumbent to compete with future entrants.
- The assets' utilisation profiles, namely changes in output over the life of the assets relative to changes in their utilisation. (See below.)

3.6.4. In Oftel's view, the purpose of the economic depreciation to be included in its calculation of costs was to address the question (in the context of a cash-flow analysis):

"What time-series of prices, consistent with trends in the underlying costs of production, yield an expected net present value of zero (i.e. normal profit)?"

This Oftel deemed as equivalent to asking:

"What is the path of prices over time in a competitive and/or contestable market?" or to constructing what Oftel called a 'competitor constraint'.

3.6.5. The competitor constraint can be defined in terms of actual competition between incumbents (competition) or potential competition from new entrants (contestability), or by some combination of both, but which must be vigorous enough to remove supernormal profits in the long run.

3.6.6. An important factor influencing the nature of competition is the total output over the asset lifetime available to incumbents and new entrants. This could be assessed by comparing:

a) The output of the incumbent and the entrant over the same period of years, in which case it can be helpful to consider the case in which the incumbent and entrant invest in the same year (the incumbent's investment being to replace the asset);

[22] See footnote 17.
[23] See Oftel (2001), "Calls to mobiles: Economic depreciation". This can be obtained at http://www.ofcom.org.uk/static/archive/oftel/publications/mobile/depr0901.htm.
[24] Ibid

b) The output over the asset life of the incumbent and entrant, where the entrant invests in the asset in a later year than the incumbent.

3.6.7. A type (b) difference, Oftel outlined, might arise from changes in market demand. If the size of the market is growing over time, there might be benefits to entering later because output (average utilisation) over the asset life will be larger which, in turn, affects the appropriate cost recovery profile for the incumbent.

> "If the incumbent knows that it will face competition from an entrant next year, which is able to produce more output over the asset lifetime than the incumbent's current asset, then it knows that it must recover sufficient of the cost this year that it can compete next year with the entrant next year and still be profitable overall. The result is to front-load the cost recovery (per unit of output)".

3.6.8. A type (a) difference, on the other hand, might seem to imply that one type of market player becomes uneconomic because, if entrants would expect to produce less output in a given set of calendar years, then entrants would be unable to compete profitably against incumbents, who are pricing to earn only normal profits.

> "In theory, entrants would be able to survive in the market only if incumbents are earning super-normal profits in this period of time. Another way of describing this situation is that there are material barriers to entry and so the market is not perfectly contestable.
>
> Such a barrier to entry might arise because of the time that it takes for a new entrant to build out a network from scratch and acquire customers. The incumbent would have gone through this process in the past, but can now replace an asset and immediately obtain high utilisation, because it already has an established network and customers.
>
> Competition from potential entrants to a contestable market would be sufficient to ensure the removal of super-normal profit (whatever the number of incumbents or the nature of competition among them). The incumbent would be unable to defer depreciation when utilisation is low. If input costs (MEA price and operating expenses) were constant, then the economic depreciation profile under contestability would be a constant annual cost recovery (in £) each year. The unit cost (or price) would be inversely proportional to utilisation."

Another example - NPT (Norway)

3.6.9. Hansen and Lie Rohr (2006)[25] discussed principles for allocating costs over time with a particular focus on the depreciation rule proposed by the Norwegian Post and Telecommunications Authority (NPT), also in the context of the introduction of a LRIC model to regulate termination prices in the Norwegian mobile market.

3.6.10. Due to the fact that NPT was not explicit about the depreciation rule being used, the authors endeavoured to decompose the formula from NPT's draft LRIC model, first deriving it analytically, on the basis of the conceptual designs of the LRIC model and, thereafter, by backward engineering.

3.6.11. They interpreted the formula as "an inter-temporal average cost adjusted for MEA price trends", but asserted that:

> "The theory of contestability where the unit price in each period equals average cost in that same period does not lend support to the NPT formula. On the contrary, any

[25] See Hansen, B. & H. Lie Rohr (2006), *A note on economic depreciation*, Telenor R&D Research Note, Norway.

application of contestability theory is forward-looking, costs incurred in earlier periods are not relevant, and this is in contrast to the NPT formula that takes into consideration costs incurred over the entire lifespan of the network under consideration.

An application of the [NPT] model yields an access price for the entire modelling period such that the net present value of costs equal revenues. The calculated access price in the 'historic years' will, however, typically differ from the actual access prices charged by market players in the same period. Furthermore, for the distant future periods, assumptions in the model are likely to prove erroneous. Thus, future 'revised' access prices will typically differ from the predicted access prices in the current model. There is accordingly nothing in the model, per se, that ensure that investors are given an appropriate compensation. It may turn out that they are overcompensated, or it may turn out that they are under compensated."

Differences between top-down and bottom-up approaches to economic depreciation

3.6.12. In theory, top-down and bottom-up approaches should yield similar results. In practice, however, very large differences can occur. A useful analysis of the differences between the two approaches is provided in a review of LLU costing methodologies prepared by Europe Economics for the European Commission.[26] In this study, Europe Economics compared a bottom-up and top-down approach to modelling the costs of providing LLU Services. They found that the differences could be very large indeed – for LLU prices in Denmark for example, they found that the bottom-up modelled charge was 10% of the top-down calculation.

3.6.13. Europe Economics identified four key methodological reasons for the very large differences between a top-down and bottom-up approaches to modelling LLU charges (of which the most significant cost was depreciation):

- the cost standard, which is concerned with the choice between LRIC, fully allocated cost (FAC) and stand-alone cost (SAC);
- the cost base, which is concerned with the choice between historic cost, current cost and forward-looking cost for the valuation of assets;
- the depreciation methodology, as discussed in detail above; and
- more general process issues (see paragraph 3.8.3 below).

3.6.14. Europe Economics noted that bottom-up models (based on engineering and current cost estimates) tend to annualise costs using the annuities approach, which captures both the depreciation charge and the capital charge. This gives a constant charge in the absence of price changes since the depreciation charge rises over time to exactly offset the fall in the capital charge.

"Where prices change over time, both approaches can be used with price tilts that take account of price changes. When prices are falling, the tilt will result in a higher initial capital charge and a falling one thereafter; where prices are increasing the opposite will be the case."[27]

[26] See the reference in footnote 21.
[27] See footnote 26.

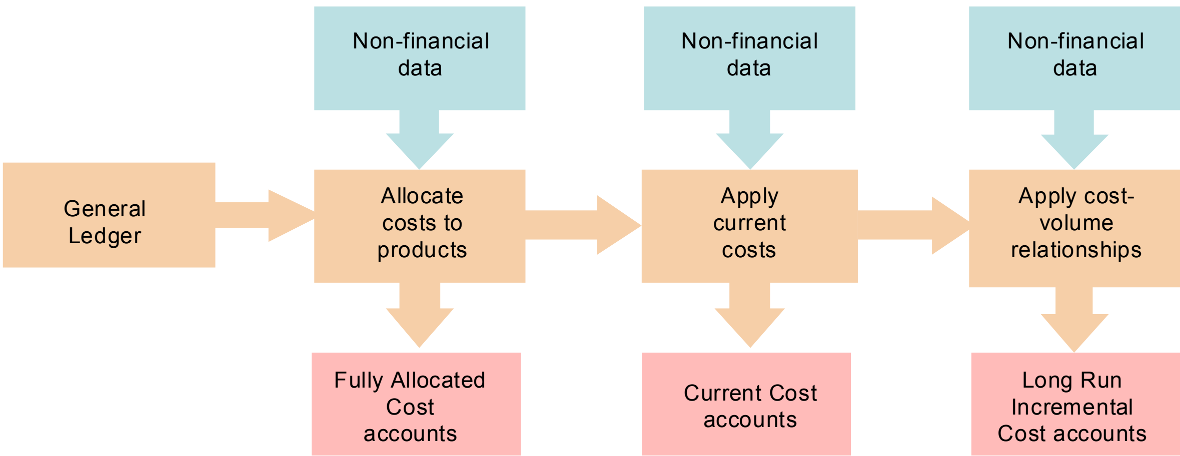
3.7. Depreciation in regulatory accounting and top-down LRIC modelling

The regulatory accounting process

3.7.1. In general terms, regulatory accounts are designed to support the regulatory regime by providing reliable information relating to compliance with regulations relating to non-discrimination and pricing (cost orientation, price capping or retail minus). A firm's own statutory and management accounts will typically not contain the required level of detail, nor, more importantly, are they likely to apply the economic cost concepts required by the regulator.

3.7.2. Figure 1 below shows the regulatory accounting process typically involved in the preparation of regulatory accounts on a long run incremental cost basis.

Figure 1: The regulatory accounting process



Source: RGL

3.7.3. Starting with information from the company's general ledger, the regulatory accounting process typically goes through three key stages:

- the allocation of costs across different business units and services;
- the restatement of asset costs from historical costs to current costs; and
- the calculation of incremental and allocation of common costs for individual services or groups of services.

Accounting depreciation methods

3.7.4. A number of different approaches to depreciation have been taken in regulatory accounts. These largely involve the straightforward application of accounting methods of depreciating the historic or current cost of assets. As noted by Europe Economics:

> "The yardstick by which these simpler [accounting] approaches should be judged is how close they are likely to come, given the nature of the asset concerned, to the theoretically correct measure of depreciation."

3.7.5. Such accounting techniques include:

- straight-line depreciation plus a return on capital employed;

- an annuity, so that the sum of depreciation and allowed return is the same in each year of the defined asset life;
- a 'tilted' annuity, designed to 'front load' unit cost recovery when real asset prices are declining.

These and other accounting techniques for depreciation are described below.

3.7.6. The most straightforward method of depreciation is the straight-line method, which spreads depreciation in direct proportion to the estimated service life of the asset. An allowed return on capital employed is added to the annual depreciation expense to determine regulated charges. This is appropriate when use of the asset is fairly uniform from year to year.

3.7.7. In the absence of asset price changes, the straight-line approach results in a decreasing annual capital charge for any given asset as it increases in age. As noted by Europe Economics:

> "This is because the depreciation charge is constant whereas the capital charge declines as the net value of the asset declines."

3.7.8. However, the rapid pace of technological change has implied increasing trends towards accelerated methods of accounting depreciation because obsolescence is more important than physical deterioration.

3.7.9. The most common approaches to calculating an accelerated depreciation charge are as follows:

- The declining balance method involves an increase over the equi-proportionate straight-line rate, which is applied to the net book value (declining balance) of the asset. The cost of the depreciable asset is never written off, as long as it stays in use. Upon disposal, any difference between the undepreciated cost and the proceeds from sale of the asset is recorded as a gain or loss from disposal.
- The declining balance method results in accelerated depreciation relative to the straight-line method. It is appropriate when assets are most efficient when new; contributing more and better services in the early years, as well as when repair expenses increase as assets get older.
- The double-declining balance method involves a formula that applies 200 per cent of the depreciation rate to the declining balance.
- The sum-of-the-years digits approach is another form of accelerated depreciation, involving use of a fraction, of which the numerator is the remaining years of useful life and the denominator is sum of the years of useful life.
- Another method, that is appropriate when depreciation is greatest in earlier years, is the constant percentage method, in which depreciation is based on a geometric progression of the successive book values of an asset over its expected useful life.

3.7.10. The service output method charges depreciation according to output generated by the asset but is not very suitable to situations in which obsolescence is important. It is more appropriate when an equitable inter-temporal distribution of the costs of assets is required.

3.7.11. An annuity approach to calculating depreciation involves the following:

- It integrates the opportunity cost of capital locked up in the asset, as well as the cost of the asset itself, into the calculation. It is generally used for the amortization of leases but rarely for fixed assets.[28]
- It assumes a 'back-loaded' depreciation profile relative to the straight-line method and increases the risk that the incumbent would fail to achieve full cost recovery for assets with high rates of technological progress and growing competition.
- In telecommunications, therefore, it has been deemed appropriate to add a 'tilt' to the annuity to bring forward some of the depreciation to earlier in the asset's life because asset prices in the industry do tend to decline over time. When this happens, future entrants are able to purchase cheaper assets, enabling them to gain a cost advantage over the incumbent unless the latter has recovered enough up-front to allow it to reduce depreciation in later years and, thereby, enable it to compete against future entrants through price reductions.

3.7.12. Europe Economics noted the conditions under which annuity depreciation is a good proxy for economic depreciation:

> "The annuity method produces the same results as economic depreciation plus a capital charge where running costs are constant between vintages and over the asset's life, output is constant and the asset life in both approaches is the same."

3.7.13. In practice, a number of different approaches can be taken. For example, in BT's statutory accounts, the UK incumbent operator states that:

> "Depreciation is provided on property, plant and equipment on a straight line basis from the time the asset is available for use, so as to write off the asset's cost over the estimated useful life taking into account any expected residual value".

3.7.14. Eircom adopts a similar approach, as revealed by the following statement from the company's financial statements:

> "Depreciation is provided on tangible assets (excluding land) on a straight line basis so as to write off their historical cost or valuation over their estimated economic lives."

3.8. Reconciling bottom-up and top down approaches to depreciation

3.8.1. In theory, the results for top-down and bottom-up models of depreciation should be the same if they are built under the same methodological assumptions. However, in practice, they can yield very different results.

3.8.2. In a report prepared for the European Commission in 2004 on the differences in LLU charges across Europe, Europe Economics asserted that the likely reason for these differences is the different incentives lying behind the two models:[29]

- Top-down models are usually built by the incumbent operator and are based on the company's accounts;
- Bottom-up models are usually built either by the regulator or by the other operators.

[28] See Hardin et al. (1999).
[29] Pricing Methodologies for Unbundled Access to the Local Loop, Europe Economics, May 2004 http://ec.europa.eu/competition/liberalization/pricing_open_loop.pdf.

3.8.3. However, they cite a number of other reasons why they might produce different results, independent of differences in the factors mentioned above or in the inputs used. These differences are:

> "Costs incurred to run Modern Equivalent Assets. As explained above, the assets that should feature in a top-down model, if current costs are deployed, are not necessarily the assets that are currently in place. Similarly, the operating expenditure in a top-down usually come from the accounts and reflect the cost of operating the assets in place. Bottom-up models however, require an estimate of costs of operating an efficient and new network. Operating costs should be adjusted to reflect this difference.
>
> Efficiency of the operator. Even assuming that MEA corresponds to the assets actually in place (a common although unlikely assumption in access network models developed by incumbents), it is unlikely that costs actually incurred by the operator in question are the most efficient. Econometric and statistical techniques are sometimes deployed to form a view on the operator's efficiency.
>
> The age of the asset to which operating costs refer. Bottom up exercises model operating costs associated with first year assets whereas top down exercises model operating costs associated with assets with a variety of ages ("mixed vintage"). This should be reflected in the depreciation profile used which, in a top-down model, should take into account a lower capital charge and higher operating costs associated with old assets (as opposed to a higher capital charge and lower operating costs associated with first-year assets of the bottom-up model)."

3.8.4. For these reasons, the report states that:

> "Top-down models [including calculations based on regulatory accounting information] are likely to produce, ceteris paribus, a higher level of operating costs than the corresponding bottom-up models".

3.8.5. This effect was modelled using a case study from Denmark. This showed (as already noted in paragraph 3.6.12 above) that a bottom-up model could generate much lower charges than a top-down model – the bottom-up modelled charge was 10% of the top-down calculation. The underlying cause was the basis for calculating the annual costs related to assets, including the use of current rather than historic costs, the inclusion of a cost of capital, different asset lives and the effect of future asset price trends.

3.8.6. The report concluded that:

> "This case study shows that although top-down and bottom-up models are both trying to model the costs of an efficient new entrant, they can produce different results. Such a divergence could, however be minimised to some extent by prior agreement on a number of key areas such as cost of capital and depreciation methodologies (and associated inputs)."

3.9. Accounting standards and depreciation in Statutory Accounts

3.9.1. In preparing its statutory accounts, eircom applies international reporting standards. These include:

- IAS 16 Property, Plant and Equipment
- IAS 8 Accounting Policies, Changes in Accounting Estimates and Errors

- IAS 36 Impairment of Assets

3.9.2. Relevant extracts from IAS 16 Property, Plant and Equipment are set out below.

Valuation Basis

"An entity shall choose either the cost model in paragraph 30 or the revaluation model in paragraph 31 as its accounting policy and shall apply that policy to an entire class of property, plant and equipment."[30]

Cost Model

"After recognition as an asset, an item of property, plant and equipment shall be carried at its cost less any accumulated depreciation and any accumulated impairment losses".[31]

Revaluation model

"After recognition as an asset, an item of property, plant and equipment whose fair value can be measured reliably shall be carried at a revalued amount, being its fair value at the date of the revaluation less any subsequent accumulated depreciation and subsequent accumulated impairment losses. Revaluations shall be made with sufficient regularity to ensure that the carrying amount does not differ materially from that which would be determined using fair value at the end of the reporting period"[32]

Depreciation

"The residual value and the useful life of an asset shall be reviewed at least at each financial year-end and, if expectations differ from previous estimates, the change(s) shall be accounted for as a change in an accounting estimate in accordance with IAS 8 Accounting Policies, Changes in Accounting Estimates and Errors"[33]

"The future economic benefits embodied in an asset are consumed by an entity principally through its use. However, other factors, such as technical or commercial obsolescence and wear and tear while an asset remains idle, often result in the diminution of the economic benefits that might have been obtained from the asset. Consequently, all the following factors are considered in determining the useful life of an asset:

(a) Expected usage of the asset. Usage is assessed by reference to the asset's expected capacity or physical output.

(b) Expected physical wear and tear, which depends on operational factors such as the number of shifts for which the asset is to be used and the repair and maintenance program, and the care and maintenance of the asset while idle.

(c) Technical or commercial obsolescence arising from changes or improvements in production, or from a change in the market demand for the product or service output of the asset.

(d) Legal or similar limits on the use of the asset, such as the expiry dates of related leases."[34]

3.9.3. The key sections of IAS 8 Accounting Policies, Changes in Accounting Estimates and Errors are set out below.

---

[30] IAS 16 para 29
[31] IAS 16 para 30
[32] IAS 16 para 31
[33] IAS 16 para 51
[34] IAS 16 para 56

"An estimate may need revision if changes occur in the circumstances on which the estimate was based or as a result of new information or more experience. By its nature, the revision of an estimate does not relate to prior periods and is not the correction of an error."[35]

"To the extent that a change in an accounting estimate gives rise to changes in assets and liabilities, or relates to an item of equity, it shall be recognised by adjusting the carrying amount of the related asset, liability or equity item in the period of the change**."**[36]

"The effect of a change in an accounting estimate, other than a change to which paragraph 37 applies, shall be recognised prospectively by including it in profit or loss in:

(a) The period of the change, if the change affects that period only; or
(b) The period of the change and future periods, if the change affects both."[37]

3.9.4. The key section of IAS 36 Impairment of Assets is set out below.

"If, and only if, the recoverable amount of an asset is less than its carrying amount, the carrying amount of the asset shall be reduced to its recoverable amount. That reduction is an impairment loss."[38]

3.10. Eircom's depreciation policy – statutory and regulatory accounts

3.10.1. Eircom's published statutory accounts are prepared under international financial reporting standards. Regulatory accounts are not stated to be prepared in accordance with accounting standards, rather:

"The 2008 regulatory financial statements have been prepared based on the statutory accounts prepared in accordance with IFRS."[39]

3.10.2. This approach can be contrasted with, say BT, whose regulatory accounts state that it applies policies:

"which means the manner in which the requirements of the Companies Act 1985 as amended by the Companies Act 1989, **the International Financial Reporting Standards (IFRS)** as adopted by the European Union (EU) and BT's accounting policies **whenever not superseded by the Regulatory Accounting Principles**, are applied by BT in each of the Current Cost Financial Statements."[40] [Emphasis added]

3.10.3. The assumed asset lives for certain assets in the regulatory accounts are different to the statutory accounts. In particular, the regulatory accounts state that:

"ComReg have determined that for the purposes of calculating the net book value and the depreciation charge to be used in the statements, the company must use the asset lives which were applicable to the 1997/98 Statutory Accounts, with the

[35] IAS 8 para 34
[36] IAS 8 para 37
[37] IAS 8 para 36
[38] IAS 36 para 59
[39] See eircom's current cost and long run incremental cost statements, 30 June 2008. The 2008 HCA accounting documents also state that "The 2008 regulatory financial statements have been prepared based on the statutory accounts prepared in accordance with IFRS". See eircom's Historical Cost Separated Accounts, 30 June 2008.
[40] See BT's Current Cost Financial Statements for 2008.

exception of land and buildings, poles and access network overhead cable where specific lives have been directed by ComReg."[41]

3.10.4. Useful economic lives shown in eircom's regulatory and statutory accounts are provided for major categories only. In practice, eircom applies different lives to a larger number of categories. These are set out in Annex II (Table 33) at the end of this Report.

3.11. Assessing asset lives in practice

3.11.1. Asset lives determine the period over which an asset is to be depreciated and the chosen profile of depreciation. This, in turn, determines the profile of capital recovery by the firm.

3.11.2. The US National Association of Regulated Utility Commissioners (NARUC) in its Public Utility Depreciation Practices stated that the following factors should be taken into account in assessing asset lives:

- Physical factors:
  - Wear and tear
  - Decay or deterioration
  - Action of the elements and accidents.
- Functional factors
  - Inadequacy
  - Obsolescence
  - Changes in art and technology
  - Changes in demand
  - Requirements of public authorities
  - Management discretion
- Contingent factors
  - Casualties or disasters
- Extraordinary obsolescence.

3.11.3. FRS 15 requires that the following factors be taken into account when assessing the useful economic life of an asset:

- "the expected usage of the asset by the entity, assessed by reference to the asset's expected capacity or physical output
- The expected physical deterioration of the asset through use or effluxion of time; this will depend upon the repair and maintenance programme of the entity both when the asset is in use and when it is idle
- Economic or technological obsolescence, for example arising from changes in improvements in production, or a change in market demand for the product or service output of that asset
- Legal or similar limits on the use of the asset , such as the expiry dates of related assets"[42]

[41] Ibid, page 29.

Estimating economic life using statistical analysis

3.11.4. Depreciation policy applied by US regulators in price setting has made extensive use of statistical analysis of lives. In a 1999 study, Barreca reviewed the effectiveness of three commonly used asset life techniques.[43]

3.11.5. The first, the traditional approach to assessing the mortality of assets, is rooted in actuarial theory which has been applied to tangible assets since the 1920s. In the same way that life insurance companies have successfully based their life insurance premiums on analyses of past experience relating to large numbers of people to determine the mortality patterns for human beings, studies of utility and other tangible assets have indicated that such properties tend to follow their own characteristic patterns of retirements and survivors.

3.11.6. These approaches, according to EEI/AGA (2003)[44], may be described as:

"Statistical approaches [according to probabilities indicated by recorded facts] based on the history of additions to, retirements from, and balances of the plant account over a selected band of years".

Actuarial methods

"…are used to produce some major tools used in depreciation accounting, such as survivor curves, retirement frequency distribution, probability life curves, and remaining life expectancy at any age".

3.11.7. However, it was observed that this method tended to overstate useful lives in the presence of functional (specifically technological) obsolescence. This traditional approach is therefore only appropriate for assets where obsolescence is absent or negligible. In the early years, technological obsolescence was taken into account by subjectively adjusting the useful life produced by traditional mortality practices. This was the approach taken by, for example, the FCC in setting the depreciation lives for telecommunications assets in the 1980s and 1990s.

3.11.8. The second is what Barreca (1999) calls the substitution approach, which is concerned with modelling the pace of substitution of an older technology by a newer one. Once their forecasted rates of technology substitution are determined, asset lives are computed using the same fundamental concept used in the traditional mortality approach. These methods were enhanced through the development of 'technological forecasting', which can be used to accurately project the life cycles of both emerging new technologies and those of the obsolete technologies they are replacing.

3.11.9. The third approach is a merging of the strengths of each of the traditional method of mortality analysis and the technological forecasting approach. This 'combined obsolescence' model is used to isolate and quantify technological obsolescence, with which traditional mortality influences are combined to yield a composite estimate of the asset's life. [45]

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[42] FRS 15
[43] Barreca, S. (1999), *Comparison of Economic Life Techniques*, Technology Futures Inc., Austin, Texas.
[44] See "Introduction to Depreciation and Net Salvage of Public Utility Plant and Plant of Other Industries" produced by the Edison Electric Institute (EEI) and American Gas Association (AGA), May 2003.
[45] See Comparison of Economic Life Techniques - Case Studies of Various Economic Life Estimation Techniques for Mass Property Influenced by Technological Obsolescence Technology Futures, Inc. 1999

3.12. Technological obsolescence and stranded assets

3.12.1. The determination of useful economic lives of telecommunications assets is complicated by the rate of technological change in the industry. Asset lives are a function not only of the estimated time to physical obsolescence but also to technological obsolescence, which occurs as a result of technical innovation and evolving market demand for newer and more advanced services.

3.12.2. New technologies are usually superior to old assets in terms of functionality and efficiency. As a result the expected economic life of assets may reduce with the introduction of lower cost, more efficient alternatives. At present, the telecommunications industry is beginning to evolve towards Next Generation Networks (NGNs). Specific examples of new emerging technologies and the older technologies they are replacing include fibre replacing copper access lines and IP replacing circuit switching.[46]

3.12.3. Assets become stranded due to technological obsolescence, when it is no longer possible to earn an economic return on these previously sunk investments. It can result in losses for the company. When this is caused by changing market circumstances, the associated losses are justifiably viewed as a potential cost of doing business, a risk the firm freely undertook in making the investments in the first place.

3.12.4. However, if assets are stranded as a result of legal or regulatory changes (e.g., a new regulatory technology becomes available or politically feasible) that could not have been reasonably anticipated when the investment was made, then there is a case for compensating the firm for its losses. Ralph (1996)[47] asserts that there are two primary conditions for legitimate claims of compensation for stranded assets. They are:

- the assets must be sunk, otherwise costs could be recovered by sale or alternative use; and
- the firm under the amended regulatory regime must not yet have recovered, and must be unlikely ever to recover, the associated investment costs.

Otherwise, Ralph (1996) claims, there is no loss for which compensation can be claimed.

3.12.5. However, the losses made due to the regulatory change must be offset against any monopoly rents that the firm will be able to claim in the future, as a result of the status it obtained under the earlier regulatory regime.

> “For example, a firm protected from entry under the original regulatory scheme will have gained an established market presence, which provides market recognition, share, and – because of its sunk assets, the very thing compensation is being claimed for – the ability to make strong credible threats to competitors. The market valuation of these assets granted to the firm claiming compensation by the previous regime must be off-set against the losses it claims.”

[46] Varying technologies and asset vintages also means that different types of equipment may have very different useful economic lives. It is important to consider how assets should be classified, for example, on a functional basis (like location in the network) or a network element and component basis (like the technology involved). These options were explored by ODTR (now ComReg) in 1999, who stated that the latter approach might better capture the fact that varying technologies in each asset class might render it inappropriate to use one overall asset life for all assets in that class. In other words, the cost drivers, and hence the apportionment of costs, of the components of an asset may be different.

[47] See Ralph, Eric (1996), “Assets stranded by unanticipatable regulatory change”, CRNEC, School of Business and Economics, University of Auckland, New Zealand.

3.12.6. The mere existence of a stranded asset is not enough. It must additionally be shown that the firm claiming compensation made its investments without having any reason to suspect a subsequent change in the regulatory environment. Put another way, the investment must be shown to have been economic, that is, profit-maximising given the original regulatory regime.

3.12.7. It must also be shown that the losses made on stranded assets would not have occurred except for the regulatory change. If other events rendered the assets worthless, there is no loss to be recovered. Therefore, new inventions or investments (e.g., in copper wire) which the firm itself has 'duplicated' (by laying fibre optic cable) prior to the change in regulation means the regulator would not be responsible for any losses sustained by the firm.

The baseline for estimating losses is a fair rate of return on the initial investment, rather than the firm's ex ante anticipated gains, which might have included an element of extra-normal profits. Therefore, a regulatory change that does not force a negative economic profit (as opposed to a loss of anticipated rents) cannot sustain a claim for compensation..

3.13. Conclusions

3.13.1. Depreciation policies are an important part of cost determination in telecoms. Fixed assets and the associated costs of financing these assets comprise a significant proportion of total costs. In particular, how these costs are allocated into different periods can make a significant difference to prices and investment decisions.

3.13.2. Economic depreciation provides a framework for the calculation of a theoretically optimal allocation of the costs of fixed assets across their useful lives. However, the calculation of economic depreciation in practice is not straightforward and requires the use of subjective data on future demand, technology and costs.

3.13.3. The alternative to economic depreciation – accounting depreciation – requires much less effort to compute, and under certain circumstances will give a good approximation to an economic approach to calculating depreciation. In principle, however, the asset lives used under economic and accounting approaches to depreciation should be the same.

3.13.4. For regulatory accounting purposes, a true economic approach to calculation of depreciation is not feasible as the information and computational requirements would be too great. Regulatory accounts, therefore, always apply an accounting approach to depreciation, and this will help provide a first order assessment of the underlying economic cost of different services.

3.13.5. However, for the one-off review or setting of prices for individual services on a case-by-case basis, it may be preferable to use an economic approach to calculating depreciation. The decision of whether or not to use an economic approach should take into account a number of factors including:

- the likelihood of it generating a materially different allocation of costs over time.
- the primary regulatory objective (e.g. price-setting, promotion of investment, or stimulation of competition).
- the scale of potential difference between an accounting and economic approach (which in turn may depend on a number of factors including: pace of technological change, future cost profiles, and expected demand.

4. ComReg's depreciation & asset life policies

4.1. Introduction

4.1.1. This Section outlines regulatory policy on asset lives in Ireland to date and the development over time of eircom's published asset lives.

4.2. Relevant documents from the regulator

4.2.1. ODTR/ComReg documents relevant to the application of asset lives in calculating depreciation are as follows:

- ODTR 99/26, "Costing methodologies for use in accounting separation", Consultation paper, April 1999.
- ODTR 99/43, "Costing methodologies for use in accounting separation", Decision Notice 8/99 and Consultation Report, July 1999.
- ComReg 04/69 – Consultation and draft decision "Finalisation of 2002/03 and revision of 2003/04 Interim Interconnection Conveyance rates".

4.2.2. ODTR 99/43 sets out ODTR's view on depreciation and asset lives at the time, as shown in Table 3 below.

Table 3 ODTR 99/43, "Costing methodologies for use in accounting separation

Decision 7.3	Asset lives should be set on the basis of a network element and component basis and should be thoroughly reviewed on a yearly basis. The assets lives used in the statutory accounts should also be used in the separated accounts. The Director may adjust for inappropriate asset lives, when regulatory decisions are being made based on historical costs.
Decision 7.4	Different asset lives should be calculated for similar assets based on different technology.
Decision 7.7	The treatment of excess depreciation shall be in accordance with the policies adopted in the statutory accounts.

Source: ODTR

4.2.3. ComReg, in its consultation document 04/69, reviewed carrier billing costs. As part of this review, the depreciation period relating to carrier billing systems was also reviewed and amended from 4 years to 6 years.

4.3. Asset lives in eircom's statutory accounts

4.3.1. From 2006 eircom has prepared its accounts in accordance with International Financial Reporting Standards, as discussed in section 3.9 above.

4.3.2. Eircom's annual report and accounts for the year ended 30 June 2008 states that:

"Depreciation is provided on property, plant and equipment (excluding land), on a straight line basis, so as to write off their cost less residual amounts over their estimated economic lives."

and that:

"The group's policy is to review the remaining economic lives and residual values of property, plant and equipment on an ongoing basis and to adjust the depreciation charge to reflect the remaining estimated life and residual value."[48]

4.3.3. The estimated economic lives of tangible assets as stated in the published statutory accounts are shown in Table 4 below.

Table 4 Eircom's estimated economic asset lives – Statutory Accounts

Asset Class	Category	Estimated useful economic life				
		2000 - 2003	2003 - 2005	2006	2007	2008
Buildings		40	40	40	40	40
Network services						
Transmission equipment	Duct	20	20	20	20	20
	Overhead cable/poles	7-8	10-15	10-15	10-15	10-15
	Underground cable	12-14	14	14	14	14
	Other local network	n/a	15	6-8	6-18	6-15
Exchanges	Exchange line terminations	6	8	8	8	8
	Core hardware/operating software	3	4	3-4	3-4	3-4
	Others	3-7	3-7	3-7	3-14	3-14

Source: Annual reports

4.4. Eircom's regulatory accounts

4.4.1. The introductory section to eircom's Historic Cost Separated Accounts for the year ended 30 June 2008 states that:

"The[se] Financial Statements have been prepared in accordance with the framework and financial statement disclosure set out in these Decision Notices…"[49]

In respect of asset lives, the relevant Decision Notice (as outlined in Section 4.2 above) is D8/99, which, as also outlined, stated that the asset lives used in the historic cost separated accounts should be the same as in the statutory accounts.

4.4.2. However, the Report of the Independent Auditors to Eircom Limited in the 'Basis of audit opinion' states that:

"Decision Notice D7/01 and directions by way of letter dated 18 April 2001, inter alia, require the company to use 1997/98 asset lives for core network and access network assets except for local network overhead fibre cable, local overhead

[48] Eircom Ltd Financial Statements for the year ended 30 June 2008 Note 2.11
[49] Eircom, Historical Cost Separated Accounts for the year ended 30 June 2008 Financial Statements p2.

> copper cable and local network poles, where specific lives of 10 years, 10 years and 15 years respectively were directed…"[50]

4.4.3. Decision Notice D7/01 states that:

> "In its Financial Reporting *eircom* uses asset lives as published in the Annual Report. However, for RIO rate calculation purposes the Director [now Commission] considers that the Asset Lives being used for accounting purposes prior to 1997/98 are more appropriate and has directed *eircom* to use those rates."

Note that Decision Notice D7/01 came in the context of eircom's Reference Interconnect Offer (RIO) and the move, at that time, to LRIC-based charges for core conveyance interconnection rates. The Decision also stated that:

> "The decisions set out in this Decision Notice will be incorporated into *eircom*'s published Separated Accounts for the year 2000/2001."

4.4.4. The auditor's report on the regulatory accounts notes that:

> "In order for the company to comply with Decision Notice D7/01 it has had to amend certain balances obtained from the general ledgers and other accounting records of the company. This is a departure from the general principles for preparation of "top down" separated financial statements."[51]

4.5. Differences between eircom's statutory and regulatory accounts

4.5.1. Eircom currently applies different useful economic lives for determining depreciation in its statutory and regulatory accounts for a small number of assets, as illustrated in Table 4 above.

4.5.2. It is unusual for the two sets of accounts to apply different useful economic lives. In eircom's case, it has resulted from a direction (in 2001) from the regulator to revert to pre-privatisation asset lives (thereby deviating from those being used by the company's new owners in its statutory accounts since 1998/99).

4.5.3. The 2001 decision (articulated in a letter to eircom) seems to imply that the regulator did not think the new asset lives (adopted in eircom's statutory accounts) reflected efficient cost recovery or an appropriate balance between the interests of shareholders and users in the newly liberalised and regulated environment. This would explain the direction to the company to revert to pre-privatisation asset lives in its regulatory accounts in the interests presumably of reducing charges.

[50] Eircom , Historical Cost Separated Accounts for the year ended 30 June 2008 Financial Statements P 11
[51] Eircom's Historical Cost Separated Accounts 30 June 2008 Audit opinion p9

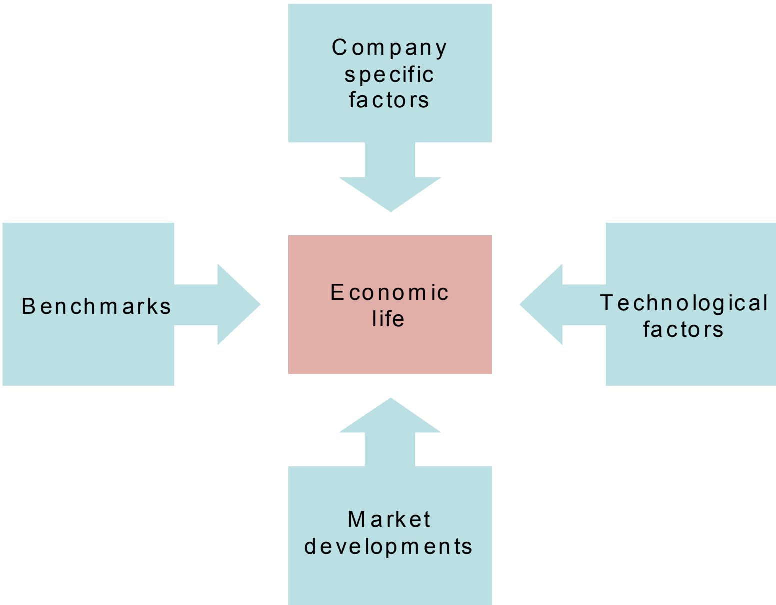
5. Recommended useful economic lives for eircom

5.1. Introduction

5.1.1. This section sets out our recommendations on proposed useful economic lives to apply to eircom.

5.1.2. Our approach is illustrated in Figure 2 below.

Figure 2 Approach to determining recommended useful economic lives for eircom



Source: RGL

5.1.3. The useful economic life of an asset will depend upon a number of different factors including market developments, technological improvements and company specific factors. For each major asset category, we have attempted to identify relevant factors contributing to the likely useful economic life of eircom's assets.

5.1.4. Market developments that can impact on asset lives include changes in demand that may require investment in new equipment, or market entry by competitors with new technology which is able to offer services that existing equipment cannot provide, either at all, or on a cost effective basis.

5.1.5. Technological factors can include new technologies, standards or levels of efficiency which render existing equipment obsolete.

5.1.6. Company specific factors that can impact on asset lives include issues such as the availability of finance for investment in new equipment, maintenance policy and network development strategy.

5.1.7. Generally speaking, it is reasonable to expect telecom asset lives to be broadly similar in different countries, particularly where market conditions are similar. Certain geographic factors such as the weather might be expected to have some impact on asset lives, and these would need to be examined on a case-by-case basis.

5.2. Benchmarking

In order to test the reasonableness of eircom's assumed useful economic lives and prepare recommendations, we have collated useful economic life data from a range of sources including:

- Responses to a ComReg questionnaire sent to a range of Irish telecom operators and European telecom regulators;
- Annual reports from European and international incumbent fixed line operators;
- Telecom regulatory publications/decisions; and
- Consultants' reports.

Use of benchmarks

5.2.1. Inevitably some degree of caution should be used when comparing assumed asset lives from different sources:

- Problems of definition. As a result of the technological complexity of the industry, assets that serve a similar purpose are often defined differently among operators. Assets that cannot be reliably included in our categories have not been included in our benchmark data.
- Problems of categorization. Asset life data which aggregates or overlaps the individual asset categories used on our benchmarking have not been included.

5.2.2. In our view, the wide range of asset lives typically shown in annual reports means that, without further disaggregation, they are of only limited use in determining appropriate economic lives for specific assets. By way of example, Belgacom (the Belgian incumbent) states that it depreciates its transmission assets over 4 to 10 years. Whilst this range provides an indication of the bounds of economic lives for the company, the accounts do not give more information on the assumed lives of different types of assets within this group.

5.2.3. Given this lack of detail in published annual reports, we have focussed our benchmarking on more disaggregated data available in individual regulatory decisions, and as submitted by US telecom operators to the US regulator, the FCC.

5.2.4. Benchmark lives and research data can reasonably be applied where (a) there is evidence as to why assumed asset lives in Ireland are, as a matter of fact, higher or lower than those applied in other countries; or (b) there is a satisfactory, evidenced explanation as to why asset lives in Ireland can reasonably be expected to be different to those in other countries.

Relevance of international benchmarks to eircom

5.2.5. As illustrated in Figure 2 above, a wide range of technical, operational, and market factors can impact on the actual useful lives of assets in a particular company. To the extent that these differ between eircom and other companies they may explain a different asset life.

5.2.6. However, many factors will be similar across different countries and companies, and benchmarking does provide a very useful tool to provide guidance on likely asset lives. The application of benchmarks can be overruled where there is evidence that actual lives are different from those benchmarked, but in the absence of such evidence it is not unreasonable to apply a benchmark life, particularly where this is supported by other evidence on asset lives.

5.3. Defining asset categories

5.3.1. A fixed telecoms network operator like eircom has a large number of individual asset categories in its accounts (over 160). It would not be practical to individually assess the useful economic life of each of these classifications. Rather we have grouped together assets by categories with similar characteristics and considered the likely range of useful economic lives for these different categories of assets, using sub-categories where appropriate.

5.3.2. We have reviewed the asset categories used in different parts of the telecoms industry, including operators and regulators in a range of countries. In compiling our asset categories we have also considered how telecom networks might evolve with time and technological change.

A hierarchical approach

5.3.3. In defining asset categories we have adopted a hierarchical approach with 13 top level categories, that reflect the key elements of telecoms networks today and allow for the advent of new technologies

5.3.4. We have added further 2nd level categories where necessary, to differentiate between significantly different types of assets within each top level category, which are likely to have different useful economic lives.

Asset Categories

5.3.5. The 13 main categories of assets as shown in Table 5 below.

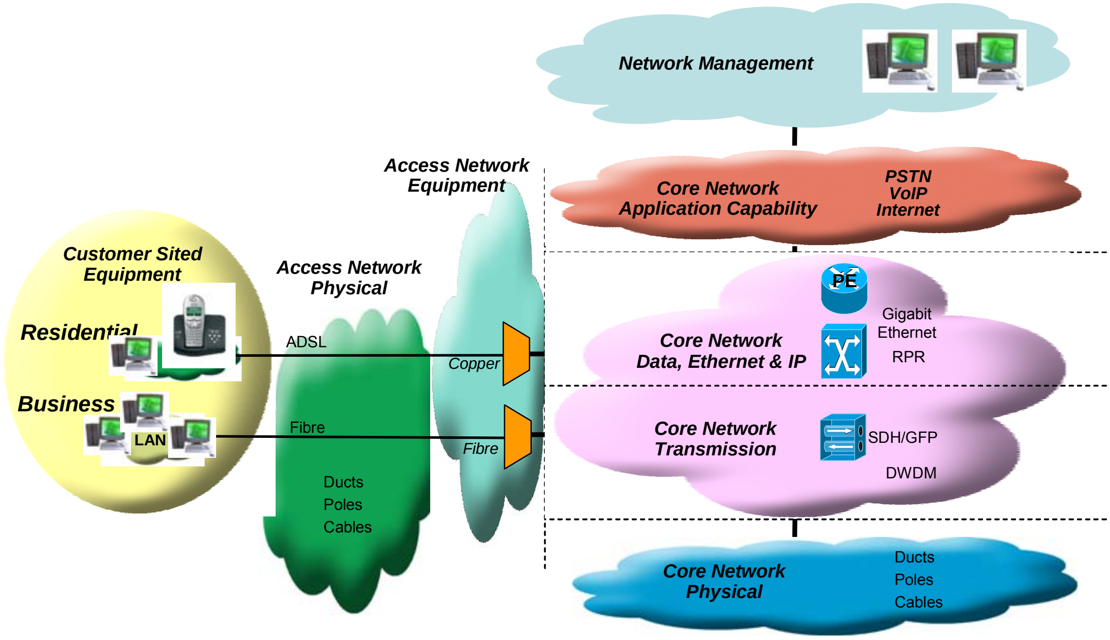
Table 5 Level 1 Asset Categories

1	Customer Sited Equipment	8	Network Management Equipment & Network Operations
2	Access Network - Physical	9	Land, Buildings, M&E Equipment
3	Access Network - Equipment	10	Vehicles
4	Core Network - Physical	11	IT systems
5	Core Network - Transmission Equipment	12	Office equipment
6	Core Network - Data, Ethernet & IP Equipment	13	Licences & IPR
7	Core Network - Application Capability Equipment		

Source: RGL

5.3.6. The network related assets are illustrated in Figure 3 below.

Figure 3 Network asset categories



Source: RGL

Core Network and Access Network distinctions

5.3.7. The assets for the core parts of the network, distinct from the access network, have been divided into 4 categories (which could be expected to have different asset lives):

- the physical assets – civil works, ducts, poles, cables etc.;
- the active transmission equipment – essentially transporting services from A to B independent of the type of service;
- the data transport layer – managing data streams of whatever type, ensuring they reach the correct destination points; and,
- the 'intelligent' parts of the network where services and applications, from traditional voice calls to more recent innovations such as 'presence' (the ability to see whether someone is connected / online) and instant messaging, are provided.

Structure of this Section

5.3.8. The remainder of this section is structured as follows. For each main category of assets, the following information is provided:

- Technical description
- Details of any sub-categories
- Technical issues affecting economic asset life
- Eircom specific factors

- Market developments
- Benchmarks
- Recommended life

5.4. Customer Sited Equipment

Technical description

5.4.1. Customer sited equipment refers to equipment situated at the customer's property and used to terminate services of various types. Typically this is more likely to be related to business services than residential services where customers are more likely to own the terminating equipment (for example, broadband modems and handsets).

5.4.2. Sub-categories are shown in Table 6 below

Table 6 Customer Sited Equipment - subcategories

Ref	Subcategory	Description
1.1	Customer Sited DSL Equipment	DSL 'modems' and related filters, etc. May include Voice over IP [over DSL] equipment in some applications.
1.2	Customer Sited Data, Ethernet & IP Terminating Equipment	Business services equipment including Ethernet data equipment & Ethernet switches, IP bridges and routers, etc.
1.3	Customer Sited Transmission Terminating Equipment	Business services equipment such as PDH or SDH for leased circuits and C/DWDM for specialist applications
1.4	Customer Sited Application Capability Equipment	Where managed services are provided there is likely to be equipment and / or software providing a particular service or application. This may include, for example, equipment & software associated with call servers for voice over IP applications, messaging applications, internet security or user authentication capability.

Technical issues affecting economic asset life

5.4.3. Equipment for use on customer sites is affected by a number of factors which tend to reduce the effective life when compared with similar equipment designed for use in controlled 'exchange' environments. For example, equipment manufactured for location at customer's premises is usually designed and manufactured in a manner intended for the mass market – where cost is more important than reliability and robustness. Also, customer sited equipment is not in an environment that can be controlled by the provider and may be subject to wide variations in heat, humidity, ventilation and to less regulated power supplies.

Eircom specific factors

5.4.4. We have not identified any factors that would suggest eircom's Customer Sited Equipment would have a different useful economic life to that of other fixed line operators.

Market developments

5.4.5. The type of Customer Sited Equipment in a network depends on technology and services. For example, the transition from dial-up internet access to broadband has seen widespread deployment of various broadband modems, and development of the market which has driven forward so that modems are replaced by higher speed versions a few years later – despite being technically still functional.

5.4.6. In the business market, such trends are also evident but are likely to be driven more by identifiable business needs than marketing of new services.

Recommended useful economic lives

5.4.7. The maximum useful life of 12 years used by eircom in its regulatory accounts relates to FM (radio)– Internet access and operator equipment, although this item is largely fully depreciated.

5.4.8. Other major eircom Customer Sited Terminating Equipment categories depreciated over 11 years are; customer sited equipment for 'PRA's, and FP', '2 Meg DPL's', and 'Digital Priv'.

5.4.9. Our recommendation is for lifetimes of 4 to 8 years, with the longer lives being for more specialist business equipment and shorter ones for residential mass market items (in particular DSL equipment). We recommend a shorter life for DSL equipment for two reasons. Firstly, where this equipment is used by residential customers it is likely to have a relatively shorter working life and also customers are more likely to churn (i.e. not renew their subscriptions). Secondly, the rapid rate of change of consumer expectations in this area, for example, for the inclusion of WiFi, print servers, network media storage in these devices.

5.4.10. 'Customer Sited Application Capability Equipment' includes 'Operator equipment' on which eircom have commented. Much of this equipment is of an IT nature whose useful economic life is less than 12 years

5.4.11. Recommended useful lives for Customer Sited Equipment are set out in Table 7 below.

Table 7 Customer Sited Equipment - Recommended Useful Economic Lives

Ref	Subcategory	Current Useful Economic life - Regulatory Accounts	Current Useful Economic life - Statutory Accounts	Recommended Useful Life
1.1	Customer Sited DSL Equipment	6 years	6 years	4 years
1.2	Customer Sited Data, Ethernet & IP Terminating Equipment	6-12 years	6 years	8 years
1.3	Customer Sited Transmission Terminating Equipment	11 years	6 years	8 years
1.4	Customer Sited Application Capability Equipment	12 years	4 years	8 years

5.5. Access Network – Physical

Technical description

5.5.1. The physical access network is the part of the network between the exchange and the customer, including:

- for overhead transport: poles and associated overhead cables;

- for underground transport: ducts, roadway and footway boxes and associated underground cables; and
- for wireless transport: towers.

5.5.2. We have distinguished physical access network assets from physical core network assets because services in these two parts of the network are typically subject to different market conditions, regulatory concerns and regulation. However, it is worth noting that in most cases there is little or no rationale for applying different lives to such physical assets - at a practical level it can be difficult to clearly separate assets into 'access' and 'core' in a straightforward manner, and many assets may in practice be used jointly for both core and access services – for example ducts can house both access and core network fibres.

5.5.3. Subcategories are shown in Table 8 below and discussed below.

Table 8 Access Network – Physical subcategories

Ref	Subcategory	Description
2.1	Poles	Telephone poles used to hold overhead copper, co-ax or fibre cables.
2.2	Towers	Towers used for wireless access including microwave radio and mobile systems.
2.3	Duct, roadway & footway boxes	Duct [conduit] pipes, installed underground to facilitate the use of copper, co-ax or fibre cables. Associated manholes / boxes / chambers in the pavements and roads.
2.4	Overhead cables & fibre	Overhead copper, co-ax or fibre cables carried on telephone poles.
2.5	Underground cables & fibre	Copper, co-ax or fibre cables laid in duct systems underground.

Ducts and associated civil works

5.5.4. Underground telecom cables are housed in ducting pipes (made of plastic) which are placed in underground trenches, typically running under roads or pavements. The theoretical lifetime of telecoms ducting is very long indeed, and if left undisturbed, can be expected to last for well in excess of fifty years.

5.5.5. In practice, the life of ducting will depend on factors such as the incidence of road works and the accidental damage to ducts and commercial decisions, for example to lay new ducting for new cables.

5.5.6. Duct manufacturers expect their products to last for up to 100 years, as illustrated in Table 9 below.

Table 9 expected life of ducting

Source	Reference	Expected duct life
Duct manufacturer (Ronix Polymer Pvt. Ltd.)	Company website[52]	"our duct's operational life in excess of 50 years"
Duct manufacturer Emtelle	Company website[53]	"They are expected to last for 25 or 50 years without serious deterioration"
Industry organisation - Plastics Pipe Institute	Report on estimated design life of plastic piping[54]	"There is considerable supporting justification for assuming a 100-year or greater design service life for corrugated polyethylene pipe, when properly used and reasonably well installed."

Source: RGL research

Road lifetimes and duct

5.5.7. The lifetime of the roads or footways under which the majority of duct is installed is clearly a significant factor. There is not a full correlation between the life of a road and the duct since, clearly, a road can, for example, be re-surfaced without necessarily having any significant impact on the duct. However, re-surfacing will normally impact on chamber lids which will often require some re-working and certainly major changes, such as re-routing or widening of roads, is highly likely to impact any underground duct system to some extent.

5.5.8. Data from the UK suggests roads can be expected to last for 40 years or more:

> In the UK, modern asphalt roads are designed to last at least 40 years before they require major construction work. However, in practice they last much longer. The Annual Local Authority Road Maintenance (ALARM) Survey for 2000 found that half of Britain's roads have had no, or only minor repairs in the last 40 years and four per cent have been unrepaired for 100 years.[55]

5.5.9. Maintaining Agents and Local Authorities spend a significant amount of their highway maintenance budgets on footways in order that all pedestrians, including those with mobility difficulties, can travel on the footway in comfort. The footway surface deteriorates for a variety of reasons and it is important that the initial construction is such that subsequent deterioration is minimised. Although it is expected that the upper layers will need attention because of general wear, it is recommended that the foundations of footways should be sufficiently robust to give good performance over a design life of 40 years.[56]

5.5.10. The Irish Department of Public Enterprise in its guidance on construction works for cabling commented that:

> "Cable ducting when properly designed and built has a useful life in excess of 20 years" [57]

[52] http://www.ronixpolymer.com/plhdpe.html
[53] http://www.emtelle.com/?id=111
[54] http://www.hancor.com/pdf/TR43-2003.pdf
[55] Source: Asphalt Industry Alliance (AIA)
[56] Source: UK Highways Agency: http://www.standardsforhighways.co.uk/dmrb/vol7/section2/hd3901.pdf
[57] http://www.dcenr.gov.ie/NR/rdonlyres/0CC702E6-C829-4246-9136-D7BF5866E2C9/0/RecommendationsforUndergroundTelecommunicationsCableWorks.pdf

Third-party disturbance

5.5.11. A significant risk to buried ducts and chambers is typically from damage resulting from excavation works by other utilities, when such excavations are adjacent to the telecoms infrastructure and / or when older routes are imperfectly documented.

5.5.12. Experience suggests however that, while such damage does occur with some regularity, especially in urban areas with a high density of buried utilities, the damage caused is not extensive – in the context of an overall duct route – and can be repaired within a few days.

5.5.13. We would therefore expect to see the costs of such maintenance reflected in operating costs but would not expect it to be reflected in calculations of the useful life of the underlying asset(s).

Technological obsolescence

5.5.14. Technological obsolescence of ducts and associated civil works could occur if, for example, the requirement to use them for telecom cables ceased or if the cables were of such a type that the installed duct infrastructure was no longer suitable.

5.5.15. Over the history of telephone networks there have been many changes of cable technology, with one of the major transitions being from overhead cables to underground ones. For many years these underground cables, typically copper, have been placed in ducts. Additional applications such as the use of co-ax cables and, more recently, fibre cables have continued to be supported using the same ducts.

5.5.16. As and when eircom rolls out its next generation network, it is likely that it will make full use of its existing duct network in order to minimise costs.[58]

Eircom specific factors affecting duct lifetime

5.5.17. In our view, there is no evidence to suggest that the useful life of eircom's ducts and associated civil works should be any lower than that of other large fixed line operators. We would therefore expect to see a useful economic life consistent with average lives adopted by other companies or regulators.

5.5.18. By way of example, the network of metropolitan area networks ('MAN's') funded by the Irish Government (DCMNR) and European Commission, and managed by e|net were constructed to have a design life of at least 20 years, although the duct and civil works infrastructure are expected to last for significantly longer.

5.5.19. In the event of a shift towards more fibre in the network, there is a possibility that some ducts on multiple duct routes into the exchange may become redundant. This is because there are currently very large volumes of copper wire coming into the exchange from distribution points in the network which can be replaced be a much smaller number of fibres. However, we do not recommend a reduction in the average life of duct in the network to specifically take account of this development for a number of reasons. Firstly, we understand that eircom currently has no plans to substantially roll out fibre in the access network. Secondly, it is not clear what proportion of ducting would become redundant rather than simply having a greater than required capacity.

Benchmarks for duct lives

5.5.20. Eircom's assumed lives for ducts are significantly shorter than relevant benchmarks.

[58] See Analysys Mason report for UK Broadband Stakeholder Group, footnote 65

5.5.21. Data from operators in the US submitted to the US regulator supports an average duct life of around 50 years. In the US, operators filing annual financial returns to the regulator (the FCC) are required to depreciate the undepreciated value of assets over their remaining useful life for that asset. For the 19 operators reporting data on duct (or 'conduit') depreciation to the FCC in their 2007 annual returns, the average remaining life was 29.3 years and the average net book value was 61% of cost less residual value. This implies a total average life of 48 years.

5.5.22. In its 2005 statement on BT's local loop pricing, Ofcom commented that:

"BT has also informed Ofcom that the design life of modern uPVC duct is 25 years under ideal conditions. This does not take into account a number of factors including the potential impact of chemical contamination (such as from petroleum products) and any disturbances or stresses on duct caused by construction activity by contractors which tend to reduce the life of the duct. In practice, however, under ideal conditions (i.e. assuming no earth contamination by chemicals and no physical disturbances) BT expects uPVC duct to have a life longer than 25 years. BT also has some earthenware duct in service which has been in service for more than 50 years. Unfortunately BT has not been able to provide any definitive data on typical service lives or physical volumes and no design data on old earthenware duct is available. However, BT claim that duct blockages due to silt, which renders duct unserviceable, is a regular occurrence.

It is Ofcom's view that the period over which costs are recovered should more closely match the useful life of the asset. Whatever period is used the same level of revenues will be recovered over the lifetime of the asset, but recovery will be earlier or later accordingly. Given the evidence discussed above it is Ofcom's view that the useful life of duct is likely to be at least as long as the average book life of 38 years stated by BT. **Ofcom has, therefore, decided to adopt a straight line depreciation of 40 years in the regulatory accounts for BT's D and E-side duct (emphasis added)"**[59]

5.5.23. In our view, eircom's ducts will have a life greater than the 20 years assumed by the company. From a theoretical perspective, ducting can be expected to last for up to 100 years. In practice, an assumed lifetime of 50 years would not be unreasonable, and would be consistent with actual lives. The majority of research for assumed lives would suggest that a life of 40 years would be reasonable. In our view, this is more likely to reflect the average life of ducting in Ireland than the current assumed life of 20 years. We therefore propose an increase in the assumed life from 20 to 40 years.

Poles

5.5.24. The poles for overhead networks and the ducts and associated boxes for underground networks are designed such that they can be re-used with different types of cable, as cable technologies improve over time. They can therefore have a significantly longer life than the cables themselves.

5.5.25. There is evidence that poles can have a working life well in excess of fifty years if properly maintained as illustrated in Table 10.

[59] Ofcom, Valuing copper access, Final statement 18 August 2005 Paragraphs 4.42 and 4.43

Table 10 Expected life of poles

Source	Reference	Expected duct life
Wood preserver's industry survey of pole life in US	Survey[60]	"Currently, most utilities assume a 30 to 40 year life expectancy for wood poles but utility experience indicates that actual life of properly produced and maintained wood poles is significantly longer – certainly approaching 75 or more years service"
Environmental group (campaigning against use of preservatives in wood poles)	Website[61]	"In the case of wood, the utility industry expects 40 to 50 years of service (although it has been found that a bad batch of wood can yield less than 35 years of service)."

Source: RGL research

5.5.26. When poles are replaced because they are not needed (for example if cables are being placed underground), they can be reused. For example BT have stated:

> "We always investigate the possibility of using existing poles before installing any new ones."[62]

5.5.27. We note that ESB in Ireland depreciate "Distribution Plant and Structures" (which we understand includes wooden poles) over 25/30 years.

Eircom specific factors affecting duct lifetime

5.5.28. One supplier for poles to ESB and eircom states:

> "The P.D.M. Ltd., Creosoting plant near Kill, Co. Kildare, preserves Telegraph and Electricity Transmission Poles for the ESB. Eircom and Northern Ireland Electricity under controlled vacuum pressure treatment processes in addition to preserving all types of Post and Rail fencing. Creosote oil has the longest service use of any timber preservative and the industry is about to celebrate the 150th Anniversary of the vacuum and pressure treatment process. There are many instances of Creosoted Timber structures and Wood Poles still giving good service after 100 years in ground contact. In Ireland, the E.S.B. have used 1,250,000 pressure creosoted Transmission Poles in the Rural Electrification Scheme since 1947 and replacement has hardly commenced: Over 100,000 poles erected prior to 1947 are still in use. **Eircom have over 1,000,000 Creosoted Telegraph Poles standing in Ireland and of these more than 100,000 installed prior to 1930 are still giving good service**."(emphasis added)[63]

5.5.29. In RGL's view, the current assumed lifetime for poles of 15 years significantly understates their useful life. In line with benchmarks and other evidence, we suggest an increase in the useful life to 30 years.

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[60] Wood Poles: How long do they last ? Western Wood Preservers Institute http://www.woodpoles.org/PoleLifeAndLifeCycle.htm
[61] http://www.beyondpesticides.org/wood/pubs/poisonpoles/alt.html
[62] http://www.btplc.com/society/environment/epr2000/perform6.htm
[63] http://completehome.rte.ie/details/PDM_Limited/78952/

Recommendation

5.5.30. Taking into account research data, and evidence of actual lives in Ireland, we recommend a life for poles, in both the local network and in the junction & trunk network, of 30 years.

Towers

5.5.31. We understand that towers are used for wireless transmitters and receivers.

5.5.32. Design life for towers is typically 20 years, and in practice they can be expected to last much longer.

Eircom specific factors

5.5.33. There is no evidence to suggest that eircom's towers would have a different useful life to those in similar countries. We note that in 2007 eircom sold its portfolio of radio masts whilst retaining long term access rights.[64] To the extent that assets in this category relate to leased assets, the useful economic life should equal the remaining period of the lease.

Conclusion

5.5.34. We recommend an assumed useful economic life of for towers of 35 years, consistent with current regulatory and statutory lives.

Overhead and underground cables and fibre

5.5.35. Cables and fibre in the access network provide the critical access to customer premises. Whilst copper has been the preferred technology for many years, it is now being replaced, in some parts of the access network, by fibre which provides a much higher capacity. The application of fibre in the access network is typically referred to as Next Generation Network (NGN) Access technology. Fibre can be deployed to different levels in the access network – the two main options being fibre-to-the cabinet (FTTC) and fibre-to-the home (FTTH).

5.5.36. The costs of rolling out an NGN access network are very high. A report for the UK estimated the costs of a national FTTC network to be £5bn and FTTH £20-30bn.[65]

5.5.37. Given the very high costs of such a network, deployment is likely to be undertaken over an extended period and the costs of FTTH are, at present, difficult to justify replacing existing networks. For example, BT has indicated that, whilst it is planning to roll out FTTC to an initial 10m homes by 2012, it will only use FTTC for new build developments.[66]

5.5.38. The comments for overhead cable benchmarks also apply to underground cables.

5.5.39. We note that in its review of copper loop pricing Ofcom, in setting a life of 18 years for copper cables, commented:

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[64] See eircom press release 'eircom sells Mastco to TowerCom for €155m' 18 September 2007
[65] Analysys Mason Final report for the Broadband Stakeholder Group ,The costs of deploying fibre-based next-generation broadband infrastructure, 8 September 2008 http://www.broadbanduk.org/component/option,com_docman/task,doc_view/gid,1036/Itemid,63/
[66] BT press release 15 July 2008 http://www.btplc.com/news/Articles/ShowArticle.cfm?ArticleID=efd7b1fa-52ed-45bb-b530-734fac577e94

"BT has also informed Ofcom that the design life of copper cables is around 20 years under ideal conditions; and that typical service life is likely to be between 15 and 20 years although precise empirical data is not available."[67]

5.5.40. A US cable manufacturer states that:

"Outside plant (OSP) copper cables are designed based on a life expectancy of 30 years. Raw materials and finished cables are tested using life-cycle test procedures. OSP cable designs are available with many shielding options to accommodate a variety of installation environments. Choosing the appropriate shielding system for your environment will provide the greatest chance for 30+ years of trouble free service."[68]

5.5.41. For fibre, a useful indication of expected working life is provided by a US study:

"Technology Futures, Inc. (TFI) announces a new recommended depreciation life of 20 to 25 years for newly-installed fiber optic cable in the local exchange network. TFI's prior recommendation was 15 to 20 years, which reflected the combined impacts of physical mortality, technological substitution, and access line losses due to competition"[69]

5.5.42. The long life of fibre is supported by the practice of leasing fibre capacity on some networks over very long periods. For example:

"CityLink can price dark fiber from monthly service to 20 year IRU type lease"[70]

"Metromedia Fiber Network has signed a third dark-fiber lease agreement with Allegiance Telecom. Metromedia Fiber estimates the agreement to be worth approximately $130 million over its 20-year life"[71]

5.5.43. In Ireland, dark fibre is leased by e│net on the fibre network it manages for the Irish Government and local authorities. The duration of fibre leases in this case has to be restricted to the period of the e│net's network management contract – 15 years.[72]

5.5.44. Another Irish example of fibre IRU's is the 20 year contract which the higher education authorities have signed with ESBT to build the higher education network HEAnet[73]

Eircom specific factors

5.5.45. Eircom's public pronouncements on its planned investments suggest that its is still focussing on roll out of ADSL broadband and that investment in next generation network infrastructure at the access level is currently only being trialled on a limited basis. [74,75,76]

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[67] Valuing copper access, Final Statement 18 August 2005
[68] http://www.superioressex.com/communicationscable.aspx?id=1888#11
[69] http://www.tfi.com/pressroom/pr/2008_deplives.html
[70] http://www.citylinkfiber.com/darkfiber/9-leasing-dark-fiber.html
[71] http://www.photonics.com/Content/ReadArticle.aspx?ArticleID=5467
[72] Details of e│net's business available at http://www.enet.ie
[73] http://www.ces.net/doc/seminars/20050516/pr/kenny.ppt#414,15,Cross_border_fibre
[74] September 2008 financial presentation
http://investorrelations.eircom.net/pdf/eircom_1st_Quarter_Results_to_30th_September_2008_presentation.pdf
[75] Presentation by eircom Next Generation High Speed Ethernet Services June 2008
[76] Eircom press release November 2006
http://home.eircom.net/about/press/2006/November/9903968?view=Standard&main=yes

5.5.46. In the absence of any specific plans to roll out fibre to a substantial part of the network, it seems reasonable to assume that existing technology assets will continue to be used (and replaced) on the same basis that they have been in recent years. In particular, there is no evidence to suggest that access infrastructure currently in use will be rendered obsolete by the introduction of new technology.

Recommended useful economic lives

5.5.47. In line with research data and experience elsewhere we recommend an assumed useful economic life working life of 20 years for underground cables and fibre, and recognising the greater exposure to weather, 15 years for overhead cables and fibre.

Summary recommended useful economic lives

5.5.48. Recommended useful economic lives are set out in Table 11 below.

Table 11 Access Network – Physical Recommended Useful Economic Lives

Ref	Subcategory	Current Useful Economic life - Regulatory Accounts	Current Useful Economic life - Statutory Accounts	Recommended Useful Life
2.1	Poles	15 years	15 years	30 years
2.2	Towers	35 years	35 years	35 years
2.3	Duct, roadway & footway boxes	20 years	20 years	40 years
2.4	Overhead cables & fibre	8 to 10 years	7 to 10 years	15 years
2.5	Underground cables & fibre	8 to 22 years	7 to 15 years	20 years

5.6. Access Network – Equipment

Technical description

5.6.1. Access network equipment is the equipment working directly on the access network, whether copper, fibre, co-ax or wireless based. Most of the equipment in this category will be standard telecoms equipment and will be placed in the local exchange building or in conditioned outdoor cabinets. Some are also designed to be placed outdoors. Outdoor assets have been allocated a separate sub-category as they will experience different conditions and have different useful working lives.

Sub-categories

5.6.2. Subcategories are shown in Table 8 below

Table 12 Access Network - Equipment subcategories

Ref	Subcategory	Description
3.1	Active equipment incl. DSLAMs, MSANs in COs or other conditioned areas.	This sub-category includes DSLAMs and MSANs in modern copper networks as well as a wide variety of equipment supporting transmission, data and IP services [etc.] for business customers. This equipment may be using a variety of methods of access including copper, fibre, wireless and co-ax.
3.2	Switching: Line terminals	This sub-category includes remote concentrators and equivalent items (with varied names & terminologies in use from supplier to supplier) serving customers over copper access networks.
3.3	Active street cabinets & similar external equipment	This sub category includes equipment located outdoors rather than in exchange buildings or conditioned street cabinets. This will include the infrastructure of street cabinets themselves, but not equipment within them if it is also used indoors unmodified. Radio [microwave] access systems with external components and antennas are a part of this sub category.

Technical issues affecting economic asset life

5.6.3. See discussion under ‘Market developments’ below.

Eircom specific factors

5.6.4. We are not aware of any specific factors which would suggest asset lives in this category for eircom are materially different from those of other incumbent fixed line operators.

Market developments

5.6.5. As the telecoms and computer industries converge, the access area of the residential (and SME) network, which has been perhaps the most stable of all until the advent of DSL in the 1990s, is now facing change major technological change. The initial changes in services from basic PSTN, to introduce DSL, were done as overlays on top of copper PSTN services using filters. Increasingly however there are moves to introduce fibre based technologies into some of, or the entire, access network through use of MSANs or FTTC solutions, or to take fibre technologies all the way to the customer; as FTTH.

5.6.6. In contrast to the historically stable residential access network there have been many technologies in use within the business data services market over the past 30 or 40 years and the residual evidence of these technologies is evident in eircom’s asset categories. It is likely that many of the historic assets are already fully depreciated.

5.6.7. In parallel with these pressures at the physical level, the traditional voice switching architecture is being replaced with new soft-switches, call servers or IMS technologies, based on IP and delivering a much wider service set than traditional voice to customers. This has implications for the access network where traditional services, supported by switch line terminals at the access layer are progressively being replaced by IP & Ethernet based equipment such as DSLAMs and MSANs.

5.6.8. As already noted, the roll out of fibre across Ireland is only likely to take place over an extended period of time, given the huge cost of such developments.

5.6.9. Given that the next generation access network (and fibre rollout) will take many years to be implemented, it is reasonable to assume that much of the current access network equipment will continue to be used until the supporting infrastructure is rolled out.

Recommended useful economic life

5.6.10. Our recommendations are set out in Table 13 below.

Table 13 Access Network – Equipment Recommended Useful Economic Lives

Ref	Subcategory	Current Useful Economic life - Regulatory Accounts	Current Useful Economic life - Statutory Accounts	Recommended Useful Life
3.1	Active equipment incl. DSLAMs, MSANs in COs or other conditioned areas.	6 to 14 years (majority 11)	6 to 12 years (majority 6-8)	8 years
3.2	Switching: Line terminals	8 years	8 years	8 years
3.3	Active street cabinets & similar external equipment	11 to 22 years	6 to 8 years	8 to 20 years

5.6.11. The current assumed economic life of 22 years for Pair gains equipment has been reduced to 20 years, in line with the assumed life for underground copper local loop lines.

5.7. Core Network – Physical

5.7.1. Whilst it is useful to distinguish between core and access networks for accounting purposes, the factors affecting the two will be similar.

5.7.2. Developments in the core network will however, tend to take place before those in the access network. For example, the core network will have been largely upgraded to fibre, whilst the access network remains predominantly copper. Only a negligible amount of copper remains undepreciated in eircom's accounts for the core network.[77]

5.7.3. Our recommended lives for the physical assets in the core and access networks are the same, as set out in Table 14 below:

[77] Eircom confidential response of 21 December to ComReg's information request

Table 14 Core Network – Physical Recommended Useful Economic Lives

Ref	Subcategory	Current Useful Economic life - Regulatory Accounts	Current Useful Economic life - Statutory Accounts	Recommended Useful Life
4.1	Poles	8 years	8 years	30 years
4.2	Towers	35 years	35 years	35 years
4.3	Duct, roadway & footway boxes	20 years	20 years	40 years
4.4	Overhead cables & fibre	8 to 10 years	7 to 10 years	15 years
4.5	Underground cables & fibre	14 years	12 to 14 years	20 years

5.8. Core Network - Transmission Equipment

Technical description

5.8.1. This category includes all core transmission from older analogue systems (if any remain in service), through radio links to PDH, SDH and DWDM fibre systems.

5.8.2. There are some data and ethernet technologies which could be placed into either this transmission category or the following data category. We can identify a number of Ethernet based technologies such as Resilient Packet Ring [RPR], for example, in this context. Our recommendation is to treat these as being in the following "Core Network - Data, Ethernet & IP Equipment" category as, by their nature, they are specific to one technology and not normally able to transport others easily. This decision may apply to a number of systems and we believe each must be considered on its own merits.

Sub-categories

5.8.3. Sub-categories are shown in Table 15 below.

Table 15 Core Network Transmission Equipment – subcategories

Ref	Subcategory	Description
5.1	Transmission equipment < 155Mbit/s	Transmission equipment capable of transporting less than 155Mbit/s or equivalent capacity.
5.2	Transmission equipment >= 155Mbit/s	Transmission equipment capable of transporting 155Mbit/s or more; or equivalent capacity. Includes all core WDM (Wavelength Division Multiplex) equipment, whether Coarse or Dense WDM.
5.3	International Satellite Equipment	International facilities have typically attracted different, sometimes unique, terms and accordingly distinct sub-categories have been created for both international satellite and submarine cable facilities.
5.4	Submarine cable equipment	This sub-category may include domestic [national] submarine cables, for example festoon systems or across loughs, as well as international submarine cable systems.

Technical issues affecting economic asset life Transmission equipment

5.8.4. Given the ever increasing use of broadband, it is likely that core transport systems operating at speeds of less than STM-1 (155Mbit/s) are likely to be upgraded to greater capacity and may therefore have a shorter life than for equipment with greater capacity.

5.8.5. At the same time there is a shift from pure transport such as SDH towards Ethernet based selection of transport systems running on fibre or radio or, for higher capacity fibre systems using WDM. This means for operators, for which the more important core routes which are already based on WDM (CWDM or DWDM) systems are less affected by the market & technology changes than smaller core routes - where there is significant life remaining in the SDH fibre equipment that was probably only installed from the late 1990s onwards.

Technical issues affecting economic asset life - Transmission equipment < 155Mbit/s

5.8.6. As discussed above, core transmission equipment has been sub-divided into two sub-categories; these are intended to differentiate between (a) those core transmission elements which are seen as being of decreasing utility in an ever increasingly broadband world – those core network systems below a speed of STM-1 or 155Mbit/s and (b) those core transmission elements which are seen as being of continuing utility on a medium to long term basis.

5.8.7. Eircom specific factors

5.8.8. As discussed in the technical issues section above, there is a general trend towards use of wavelength based optical technologies and we note that eircom have introduced such equipment from ADVA and Transmode in the past few years.

5.8.9. This trend is also evident in the international market where a number of UK-Ireland submarine cables have been built with WDM technology.

Market developments

5.8.10. See under “Technical Issues” above.

Recommended lives

5.8.11. Recommended benchmarks are set out in Table 16 below:

Table 16 Core Network Transmission Equipment Recommended Useful Economic Lives

Ref	Subcategory	Current Useful Economic life - Regulatory Accounts	Current Useful Economic life - Statutory Accounts	Recommended Useful Life
5.1	Transmission equipment < 155Mbit/s	3 to 11 years (majority 11)	3 to 7years (majority 6 or 7)	11 years
5.2	Transmission equipment >= 155Mbit/s	6 to 11 years	6 years	11 years
5.3	International Satellite Equipment	9 years	7 years	9 years
5.4	Submarine cable equipment	8 to 9 years	7 years	9 to 15 years

5.8.12. Transmission equipment < 155Mbit/s: in our view, it is reasonable to assume an average economic life of 11 years for this category of assets, given the age profile of the asset group, current technology and eircom’s stated plans to develop its network.

5.8.13. Transmission equipment >= 155Mbit/s: in our view, it is reasonable to assume an average economic life of 11 years for both categories of assets, given the age profile of the asset group, current technology and eircom's stated plans to develop its network.

5.8.14. International Satellite Equipment: International Satellite technology is under pressure from newer, larger capacity submarine systems and we feel that the current life for this sub-category of equipment does not need to be modified.

5.8.15. Submarine Cable Equipment: Submarine cable systems can be expected to have a range of have economic lives. Shorter distance cables – such as across the Irish Sea – do not need repeaters and as such can be in use for 20 years or more. The recently decommissioned BT-TE1 cable from Dublin to Anglesey, which lasted 20 years, is an example of this. By contrast longer distance systems with repeaters may become redundant after 10 years as their capacity is restricted and becomes superseded by newer cables. We recommend an increase in submarine cable systems to between 9 and 15 years to reflect the current age of assets in use.

5.9. Core Network - Data, Ethernet & IP Equipment

Technical description

5.9.1. Data, Ethernet and IP equipment (Layer 2 and 3 of the OSI model) provide the data transport within the network – getting data packets (and equivalent) to the right parts of the network.

5.9.2. IP routers represent a major sub-category and because they tend to have major software elements, indeed sometimes differing software on the same hardware, this has been categorised as two separate sub-categories. These then represent the first two sub-categories.

5.9.3. Other forms of data equipment are most conveniently divided by their technical capability and which set of data protocols they support.

Subcategories

5.9.4. Sub-categories are shown in Table 17 below

Table 17 Core Network - Data, Ethernet & IP Equipment – subcategories

Ref	Subcategory	Description
6.1	IP & Internet Router hardware	Data equipment using the Internet Protocol (typically Layer 3)
6.2	Ethernet Transport & Switch Equipment	Data equipment using Ethernet (typically Layer 2)
6.3	ATM, Frame Relay equipment	Data equipment using ATM and / or Frame Relay Protocols (typically Layer 2)
6.4	Other data equipment	Other data equipment, older systems and less common protocols

Technical issues affecting economic asset life

5.9.5. There have been significant changes in the technology used in the core part of fixed telecoms networks in the last twenty years, with data services changing from low speed protocols such as SMDS and X.25, through Frame Relay and ATM to the current main technologies – Ethernet & IP.

5.9.6. Technology continues to evolve and it is reasonable to assume equipment will continue to be withdrawn from service after relatively short useful lifetimes and correspondingly short asset lives.

Eircom specific factors

5.9.7. We are not aware of any specific factors which would suggest asset lives in this category for eircom are materially different from those of other incumbent fixed line operators.

Market developments

5.9.8. There are some market advances in development such as MPLS-TE and PBT-TE which may ease the use of Ethernet and IP from an operational perspective however it is too early to tell what the real life impact of these might be and their impact on asset lives.

Recommended life

5.9.9. Recommended useful economic lives are set out in Table 18 below:

Table 18 Data, Ethernet & IP Equipment Recommended Useful Economic Lives

Ref	Subcategory	Current Useful Economic life - Regulatory Accounts	Current Useful Economic life - Statutory Accounts	Recommended Useful Life
6.1	IP & Internet Router hardware	6 years	6 years	6 years
6.2	Ethernet Transport & Switch Equipment	9 years	6 years	6 years
6.3	ATM, Frame Relay equipment	6 to 12 years	6 years	6 years
6.4	Other data equipment	9 to 12 years	6 to 7 years	6 to 9 years

5.9.10. We are recommending a reduction in the assumed life for Ethernet Transport & Switch Equipment to 6 years, given the pace of current technological change. Similarly, we recommend changing assumed lives for some ATM, Frame Relay equipment from 12 to 6 years. Other data equipment includes a range of different equipment which, with the exception of the MARTIS platform, we recommend changing to 6 years.

5.10. Core Network - Application Capability Equipment

Technical description

5.10.1. We have used the term "Application Capability Equipment" to cover higher functionality items such as voice switches, voicemail, instant messaging and presence applications and more specialist items such as Session Border Controllers. The term is intended to be generic and therefore allow for future capabilities as well as current ones.

5.10.2. Key equipment in this area are the switches with large custom hardware and software elements and with significant supporting software development programmes tied to the hardware vendor.

5.10.3. As the industry has developed towards NGNs and a more uniform IP world, the intention has been, and remains, to have more independence between hardware and software elements such that the hardware can be standard and useable by many software elements. Thus such 'independent' hardware and software represent the final two sub-categories.

5.10.4. There will also be a number of equipment types where the extent of custom hardware effectively makes that equipment, both hardware and software, dedicated to a single function. This type of equipment is categorised as "Custom hardware & applications".

Sub-categories

5.10.5. Sub-categories are shown in Table 19 below

Table 19 Core Network - Application Capability Equipment – subcategories

Ref	Subcategory	Description
7.1	Class 4 / 5 switch hardware (excl. line terminals)	Trunk (toll) and local voice switch hardware
7.2	Class 4 / 5 switch software	Trunk (toll) and local voice switch software
7.3	Custom hardware & applications	Specialist functional elements with custom hardware & software such as Broadband Remote Access Servers (BRAS), Session border controllers, media gateways, etc.
7.4	Server hardware	General purpose servers, such as Windows, Sun or HP devices.
7.5	Applications & OS	Software applications which are largely server independent but providing an application capability within the network. Examples might include authentication, instant messaging, voicemail etc.

Technical issues affecting economic asset life

5.10.6. The core of the network has seen some rapid change over recent years with the advent of 'NGN' voice and application capabilities progressively taking over from conventional voice switches and so-called stovepipe applications – designed and optimised for one specific function but not readily integrated with other parts of the network or applications.

5.10.7. For large established network operators there has generally been a cautious adoption of such technologies and a general desire to wait until they are more robust and operationally proven before introducing them in a widespread manner.

5.10.8. Most large operators have therefore introduced these NGN core technologies on an overlay or trial basis but have not replaced older Class 4 and 5 switches on a large scale – yet. Thus older switches have seen a longer useful life than might have been predicted a few years ago, but equally their replacement – when it happens – should be with new technologies that are expected to last for a significant life. Indeed we would anticipate that the useful lives of the new technologies should be approximately the same as those old switches which they are replacing if there is not to be a large economic discontinuity in the operator's asset and investment profile.

Eircom specific factors

5.10.9. We understand that eircom does not have significant plans to introduce Next Generation voice systems [Softswitches] in the immediate future. This implies a requirement on the existing Class 4 and 5 switches to last for the foreseeable future. Accordingly, our recommended lives for these equipment types are in line with benchmarks and the regulatory accounts.

Market developments

5.10.10. It is clear that the market has demanded increasing capability of networks, driven in large part by expectations set in the mobile world where the introduction of features and capabilities is a day to day expectation.

5.10.11. In fixed networks operators have taken different approaches to this; the most common has been to introduce additional functions as overlays in the core of the network but some – in particular BT with their "21st Century Network" programme – have major projects in progress to replace large portions of their core networks.

Recommended life

5.10.12. Recommended useful economic lives are set out in Table 20 below:

Table 20 Core Network Capability Equipment Recommended Useful Economic Lives

Ref	Subcategory	Current Useful Economic life - Regulatory Accounts	Current Useful Economic life - Statutory Accounts	Recommended Useful Life
7.1	Class 4 / 5 switch hardware (excl. line terminals)	6 to 9 years	6 to 7 years	10 years
7.2	Class 4 / 5 switch software	4 to 6 years	4 years	5 years
7.3	Custom hardware & applications	6 to 20 years	6 to 14 years	6 years
7.4	Server hardware	-	-	5 years
7.5	Applications & OS	6 years	5 years	5 years

5.10.13. We recommend that eircom adopt an average life of 10 years for hardware and 5 to 6 years for software across this category as a whole.

5.11. Network Management Equipment & Network Operations

Technical description

5.11.1. Network Management equipment is the software, and associated servers / hardware, used to manage the network equipment listed above. In addition this category covers test equipment used for operational purposes.

5.11.2. Network Management and Network Operations represent a key capability for telecoms companies and, while closely related to non-network IT, these network related capabilities do typically have their own drivers. For example many network management systems at the element level and sometimes at the network level are intrinsically tied to the related item(s) of equipment they support – one being un-useable without the other.

5.11.3. We have included in this category test equipment from the field and more specialist equipment which is fixed in place in COs / exchanges as this is all under the broad heading of Network Operations.

Sub-categories

5.11.4. Subcategories are shown in Table 21 below

Table 21 Network Management Equipment & Network Operations – subcategories

Ref	Subcategory	Description
8.1	Network management systems	Network Management equipment is the software, and associated servers / hardware, used to manage the network equipment
8.2	Fixed & Exchange Based Test Equipment	Non portable test equipment that is placed in exchanges (etc.) and used for dedicated tasks.

Technical issues affecting economic asset life

5.11.5. As stated in the description above, some of the equipment and software is intrinsically linked with the network equipment it manages. As such the same pressures that apply at the network equipment level – be they obsolescence or a need to extract greater life from the asset – would also apply to the management equipment. As such we would expect to see equivalent asset lifetimes.

5.11.6. For higher level 'independent' management systems there are different, sometimes conflicting, pressures at work. On the one hand the independence is supposed to make it easier to make enhancements and changes to the higher level system – thereby reducing the asset life. On the other hand the complexities associated with integration of higher level systems with lower level ones, which are often proprietary, means that such systems have a tendency to remain in service longer than might otherwise be desired.

Eircom specific factors

5.11.7. We are not aware of any specific factors which would suggest asset lives in this category for eircom are materially different from those of other incumbent fixed line operators.

Market developments

5.11.8. The development of genuinely independent OSS systems remains a goal for many telecoms companies and, if significant steps are made towards achieving this goal, then it would be reasonable to expect cheaper and shorter life systems to be deployed in the network.

5.11.9. Whilst the useful economic life for line testing equipment of 22 years appears longer than other benchmark asset lives, in RGL's view this type of equipment can last for long periods, provided the technology it applies to remains in use.

Recommended life

5.11.10. Recommended useful economic lives are set out in Table 22 below.

Table 22 Network Management Equipment & Network Operations Recommended Useful Economic Lives

Ref	Subcategory	Current Useful Economic life - Regulatory Accounts	Current Useful Economic life - Statutory Accounts	Recommended Useful Life
8.1	Network management systems	4 to 9 years	4 to 6 years	4 to 9 years
8.2	Fixed & Exchange Based Test Equipment	5 to 22 years	4 to 8 years	5 to 20 years

5.11.11. In addition, we would also recommend that the assumed useful economic lives for network management systems are the same as the asset lives relating to the system.

5.12. Land, Buildings, Mechanical & Electrical Equipment

Technical description

5.12.1. This category includes land, exchange and other buildings with associated mechanical and electrical equipment, fixtures and fittings.

Sub-categories

5.12.2. Subcategories are shown in Table 23 below.

Table 23 Land, Buildings, Mechanical & Electrical Equipment – subcategories

Ref	Subcategory	Description
9.1	Land – freehold	n/a
9.2	Land – leasehold	n/a
9.3	Exchange buildings	Buildings used to house voice switches, transmission and data equipment. Normally used on a very long term basis.
9.4	Building fixtures & fittings, security equipment	n/a
9.5	Phone / Internet kiosks	Public phone boxes and similar public-use street internet kiosks
9.6	AC & DC power equipment, air conditioning	Systems used to manage, smooth and distribute the public and backup power supply to network equipment.
9.7	Generators	Diesel generators used to maintain network operational when there is a failure of the public power supply.

Technical issues affecting economic asset life

5.12.3. There is currently no evidence to suggest that the overall physical structure of PSTN networks is likely to develop to such an extent that the location of current exchange buildings will change. To the extent that next generation access technologies are implemented, it is likely that they will continue to require the physical aggregation of access fibre at the exchange building. There may be occasional, one-off exchange closures or commercial redevelopments in which the exchange equipment is relocated to a nearby site, or within a new building. However, such changes should be reflected as ad hoc adjustments, rather than a revision to the average asset life.

5.12.4. Where equipment or buildings are specifically used with particular elements of the network, the life of these assets may be limited to the life of that network component.

5.12.5. For AC & DC power equipment and air conditioning, see notes against the overall “Land, Buildings, M&E Equipment” category above.

5.12.6. For batteries, supporting DC systems or larger UPS facilities have been identified as a discrete category since they do not, generally, have the same lifetime as the associated power equipment – rectifiers, generators etc. and have to be replaced at more regular intervals.

Eircom specific factors

5.12.7. We are not aware of any eircom specific factors which could be expected to have an impact on useful asset lives for this category of assets.

Market developments

5.12.8. Changes at this level of the network are driven principally by technology, rather than market, changes as discussed above.

Recommended life

5.12.9. Recommended useful economic lives are set out in Table 24 below:

Table 24 Buildings, Mechanical &Electrical Equipment Recommended Useful Economic Lives

Ref	Subcategory	Current Useful Economic life - Regulatory Accounts	Current Useful Economic life - Statutory Accounts	Recommended Useful Life
9.1	Land – freehold	Not depreciated	Not depreciated	Not depreciated
9.2	Land – leasehold	Not depreciated	Not depreciated	Not depreciated
9.3	Exchange buildings	40 years	40 years	40 years
9.4	Building fixtures & fittings, security equipment	5 years	5 years	5 years
9.5	Phone / Internet kiosks	8 years	7 years	8 years
9.6	AC & DC power equipment, air conditioning	5 to 22 years	5 to 16 years	5 to 22 years
9.7	Generators	25 years	20 years	25 years

5.13. Vehicles

Technical description

5.13.1. Like all incumbent telecom operators, eircom operates a large vehicle fleet, primarily for maintenance and installation.

Subcategories

5.13.2. Subcategories are shown in Table 25 below

Table 25 Vehicles – subcategories

Ref	Subcategory	Description
10.1	Cars	Standard cars
10.2	Vans	Standard vans
10.3	Trucks	Standard trucks
10.4	Specially fitted-out vehicles	Vehicles from any of the above categories which have been fitted out for specific telecom purposes, such as for installing poles and overhead cables.

Technical issues affecting economic asset life

5.13.3. Vehicles which have been fitted out for specific telecom purposes, where the desire is to keep them operational and avoid the need for and cost of fitting out a new vehicle, are likely to have an effective life a little longer than a non-specialist vehicle of the same type.

Eircom specific factors

5.13.4. We are not aware of any specific factors which would suggest asset lives in this category for eircom are materially different from those of other incumbent fixed line operators.

Market developments

5.13.5. We are not aware of any specific market factors which would suggest asset lives in this category for eircom are materially different from those of other incumbent fixed line operators.

5.13.6. Research data from some sources (in particular the FCC) suggests that vehicles can be expected to remain in use for longer periods than 5 years. In the US, operators filing annual financial returns to the regulator (the FCC) are required to depreciate the undepreciated value of assets over their remaining useful life for that asset. For the 18 operators reporting data on vehicle depreciation to the FCC in their 2007 annual returns, the average remaining life was 2.6 years and the average net book value was 30%. This implies a total average life of 8.6 years.

Recommended life

5.13.7. Recommended useful economic lives are set out in Table 26 below:

Table 26 Vehicles- Useful Economic Lives

Ref	Subcategory	Current Useful Economic life - Regulatory Accounts	Current Useful Economic life - Statutory Accounts	Recommended Useful Life
10.1	Cars	4 years	4 years	6 years
10.2	Vans	5 years	5 years	6 years
10.3	Trucks	5 years	5 years	6 years
10.4	Specially fitted-out vehicles	5 years	5 years	6 years

5.13.8. A key issue in considering the reasonableness or otherwise of the assumed life for vehicles is eircom's fleet replacement policy. The useful working life of most vehicles can reasonably be expected to be significantly in excess of the 4 or 5 years assumed by eircom.[78] However, if vehicles are routinely sold after 4 or 5 years, then this would be an appropriate life to adopt provided sufficient provision is made in the depreciation calculation for the resale value of the vehicles.

5.13.9. We understand that eircom does not have a vehicle replacement policy which leads to the sale of vehicles after a specific period, but rather retains ownership of the vehicles and uses them until they are uneconomic to maintain.

5.13.10. Eircom's fixed asset register includes a significant number of vehicles which are fully depreciated but which appear to still be in use. This would suggest that the current assumed useful economic lives are too short and we therefore recommend a life of 6 years for all vehicle types, more in life with actual lives reported for other operators.

[78] For example in the UK, the average life of a car has been estimated at 14 years. http://www.cfit.gov.uk/docs/2001/scot0122/scot0122/02.htm

5.13.11. In RGL's view, it would not be unreasonable to assume a useful economic life of vehicles of 6 years where there is no vehicle fleet replacement policy and that vehicles are retained until scrapped.

5.14. IT Systems

Technical description

5.14.1. The category 'IT systems' represents the systems supporting the business functions of the telecoms company rather than those supporting the network and technical functions which fall into the Network Management or Network Operations category above.

5.14.2. This would include normal office IT applications as well as finance, HR, billing etc.

5.14.3. Office data networks are included as a sub category.

Sub-categories

5.14.4. Subcategories are shown in Table 27 below.

Table 27 IT Systems – subcategories

Ref	Subcategory	Description
11.1	IT Hardware	IT hardware including servers, storage systems etc. used for IT applications (as opposed to network management)
11.2	IT Networking equipment	Data, Ethernet & IP equipment used within the IT network & office environments
11.3	IT Applications / software	Software applications used for IT applications (as opposed to network management)

Technical issues affecting economic asset life

5.14.5. Telecoms companies, as with other large 'utility' businesses, require significant IT systems for general operations including the significant aspects of customer care, billing and asset / service management as well as the routine financial, HR and other admin functions. None of these are unique to telecoms but are generally based on standard large IT system components.

5.14.6. Expenditure on major systems can be viewed as comprising an initial expenditure on an entirely new system followed by regular expenditure on upgrades. Major systems are not replaced frequently – they take a long time to plan and procure, are expensive and risky to implement.

5.14.7. Generally, major system replacements – such as an entire customer billing or provisioning system will take place infrequently – perhaps every ten years or longer. Following the implementation of a new system, regular expenditure will be needed to maintain the system, either by purchasing a new generic version of the software, or by specific modifications or updates for the firm itself to reflect its changing business (e.g. introduction of new services). The useful life of these modifications nay be short – perhaps as short as one year

5.14.8. On average, then, IT systems may have a life of between 1 year and perhaps 10 or 15 years. Overall an 'average' lifetime of 6 years is proposed.

Eircom specific factors

5.14.9. Like most incumbent telecom operators, eircom have a mix of systems, some in-house ones which have been in use over many years and which continue to be developed and supported in-house, mixed with more generic commercially available systems which might be expected to have shorter useful lives.

Market developments

5.14.10. No unique market attributes have been identified

5.14.11. Research data from some sources (in particular the FCC) suggests that IT systems can be expected to remain in use for longer periods than 4 years. In the US, operators filing annual financial returns to the regulator (the FCC) are required to depreciate the undepreciated value of assets over their remaining useful life for that asset. For the 15 operators reporting data on 'operator systems' to the FCC in their 2007 annual returns, the average remaining life was 2.7 years and the average net book value was 47% of cost. This implies a total average life of 5.7 years.

Recommended lives

5.14.12. Recommended useful economic lives are set out in Table 28 below.

Table 28 IT Systems - Useful Economic Lives

Ref	Subcategory	Current Useful Economic life - Regulatory Accounts	Current Useful Economic life - Statutory Accounts	Recommended Useful Life
11.1	IT Hardware	3 to 4 years	4 years	4 to 5 years
11.2	IT Networking equipment	4 years	3 to 4 years	5 years
11.3	IT Applications / software	4 years	4 years	3 to 6 years

5.14.13. In our view, it would be reasonable to assume a useful economic life for IT systems of 5 years for hardware and 6 years for software applications. The relatively longer life for applications arises as a result of the in-house developed systems, many of which we would expect to be in use for 10 or more years. On the other hand, software for PC's may need to be replaced more frequently – perhaps every three years or so. On average we therefore think a life of 6 years to be reasonable.

5.15. Office Equipment

Sub-categories

5.15.1. Sub-categories are shown in Table 29 below

Table 29 Office Equipment – subcategories

Ref	Subcategory	Description
12.1	Furniture	n/a
12.2	Phones	n/a
12.3	PCs & server hardware	n/a
12.4	PCs & server software	n/a
12.5	Other electrical equipment	This includes all non-IT related items from coffee machines to photocopiers etc.

Recommended life

5.15.2. Recommended useful economic lives are set out in Table 30 below.

Table 30 Office Equipment - Useful Economic Lives

Ref	Subcategory	Current Useful Economic life - Regulatory Accounts	Current Useful Economic life - Statutory Accounts	Recommended Useful Life
12.1	Furniture	Not used	Not used	4 years
12.2	Phones	3 years	3 years	3 years
12.3	PCs & server hardware	4 years	3 years	4 years
12.4	PCs & server software	Not used	Not used	4 years
12.5	Other electrical equipment	4 years	4 years	4 years

5.15.3. At present only one eircom category [6810 Electronic Office Equipment] appears to fall into this category and it has been allocated a life of 4 years. This appears reasonable.

5.16. Licences & IPR

Subcategories

5.16.1. Subcategories are shown in Table 31 below

Table 31 Licences & IPR – subcategories

Ref	Subcategory	Description
13.1	Radio Frequency Licences	n/a
13.2	Operator regulatory Licences	n/a
13.3	IPR	n/a

Recommended life

5.16.2. Recommended useful economic lives are set out in Table 32 below:

Table 32 Licences & IPR - Useful Economic Lives

Ref	Subcategory	Current Useful Economic life - Regulatory Accounts	Current Useful Economic life - Statutory Accounts	Recommended Useful Life
13.1	Radio Frequency Licences	n/a	25	Duration of licence
13.2	Operator regulatory Licences	n/a	n/a	Duration of licence
13.3	IPR	n/a	n/a	Duration of copyright etc

6. Annex I: Economic depreciation

6.1.1. This Annex provides further details of the literature on economic depreciation, including conceptions of economic depreciation coined since Hotelling (1925) and empirical studies not mentioned in Section 3.

Other definitions of economic depreciation

6.1.2. A definition that prompted a raft of studies was provided by Hulten and Wykoff (1996),[79] who related the economic depreciation of an asset to the erosion of its current and future productive capacity. The valuation of this erosion in productive capacity is a proxy for economic depreciation.[80] Jorgenson (1973) first used the idea of a 'mortality' function.[81]

6.1.3. Baumol (1971) defined it in the context of utility price regulation of the output from assets that are often under-utilised for periods and facing excess demand during other periods. Newbery (1997) considered the optimal pricing of assets requiring 'lumpy' investments.[82]

6.1.4. Kim and Moore (1988) were motivated by the facts that:

- when accounting (or 'tax') depreciation is greater than economic depreciation, the effective tax rate on true income is less than the statutory rate; and
- the observed tendencies in the US for useful asset lives as chosen by accountants to be lower than economic asset lives[83] and the contrary observation for the UK.[84]

The authors demonstrate that firms benefit from an implicit tax subsidy when accounting rates of depreciation exceed economic rates and that this divergence influences rates of asset replacement.

Other empirical studies of economic depreciation

6.1.5. Burness and Patrick (1992)[85] examined the welfare-maximising recovery of capital costs by a firm operating under rate-of-return regulation. Their optimality conditions required 'backloading' of depreciation but the authors note that this is inconsistent with the depreciation paths typically employed by regulators and firms.

6.1.6. Crew and Kleindorfer (1992)[86] introduced technological progress and competition in some of the regulated (telecommunications) firm's product lines. They conclude that a straight-line depreciation policy results in a high risk of under-recovery of capital costs, which could, in turn, be detrimental to investment incentives in the industry.

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[79] See Hulten, C. and F. Wykoff (1996), "Issues in the measurement of economic depreciation: introductory remarks", *Economic Inquiry*, 34.
[80] Alternatively, the path of economic depreciation is related to the present value of the shift in asset efficiency from one period to the next.
[81] Jorgensen, D. (1973), "The economic theory of replacement and depreciation", in W. Sellykaerts (ed.), *Econometrics and Economic Theory*, Macmillan Publishers, New York.
[82] Baumol, W. (1971), "Optimal depreciation policy: pricing the products of durable assets", *The Bell Journal of Economics and Management Science*, 2. See also Newbery, D. (1997), "Determining the regulatory asset base for utility price regulation", *Utilities Policy*, 6 (1).
[83] Observed by Most, K.S. (1984), "Depreciation expense and the effect of inflation", *Journal of Accounting Research,* Autumn.
[84] Observed by Skinner, R.C. (1982), "Fixed asset lives and replacement accounting", *Journal of Accounting Research*, Spring.
[85] See Burness, H. and R. Patrick (1992), "Optimal depreciation, payments to capital and natural monopoly regulation", *Journal of Regulatory Economics*, 4.
[86] Crew, M. and P. Kleindorfer (1992), "Economic depreciation and the regulated firm under competition and technological change", *Journal of Regulatory Economics*, 4.

6.1.7. Awerbuch (1992)[87] was motivated by regulators' use of arbitrary straight-line depreciation policies and the fact that the resulting cash flows, in the case of high rates of technological progress, are inconsistent with firms' required patterns of asset replacement and maintenance expenditure. He finds that the appropriate economic depreciation schedules are front-loaded, but asserts that regulators have shunned their use for fear of rising prices. He also finds that accelerated depreciation can, in the longer term, lead to lower regulated prices through the effect on allowed rates of return on a more rapidly declining asset base.

6.1.8. Hulten and Wykoff (1981a, b), Hulten, Robertson and Wykoff (1989) and Wykoff (1989) focused on the appropriateness of three methods of accounting depreciation in attempting to reflect economic depreciation, namely:

- A constant efficiency pattern where assets are assumed to retain full productive capacity until they fall apart;
- A straight-line efficiency pattern where the productive capacity of assets is assumed to decay in equal increments until retirement; and
- A geometric efficiency pattern where the productive capacity of an asset is assumed to decay at a constant rate.

Using second-hand resale price data, the authors accepted the geometric pattern as a reasonable approximation to economic depreciation for broad classes of assets.[88]

6.1.9. Other studies might be usefully categorised as critiquing methods of accounting depreciation. The conceptual difference between economic and accounting depreciation is that the former involves a process of valuation while the latter deals with allocation, usually of the historic cost across a period that accountants endeavour to reflect the physical life of the asset. This is reflected in studies such as:

- Marden (1957), who noted that accounting depreciation is not depreciation at all, rather the allocation of investment in plant;
- Hulten and Wykoff (1996), who, likewise, noted that accounting depreciation only provides knowledge of the historical pattern of investment and says nothing about the productive capacity of a firm; and
- Zajac (1995), who noted that, to the extent that book values are used in corporate decision-making, accounting depreciation can lead to a misallocation of resources. For example, equipment that is worth nothing on the books, suggesting that it should be replaced, might have considerable market value, whereas equipment with high book values might be technologically obsolete and worth nothing.

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[87] Awerbuch, S. (1992), "Depreciation for regulated firms given technological progress and a multi-asset setting", *Utilities Policy*, July.

[88] These included service industry equipment, office and computing equipment and non-residential structures.

7. Annex II: Recommended useful economic lives for eircom

7.1.1. Our recommended useful economic lives for key asset categories are set out in Table 33 below.

Table 33: Recommended useful economic lives for eircom's assets

Main Category	Subcategory	Current Useful Economic life - Regulatory Accounts	Current Useful Economic life - Statutory Accounts	Recommended Useful Life
1	**Customer Sited Equipment**			
1.1	Customer Sited DSL Equipment	6 years	6 years	4 years
1.2	Customer Sited Data, Ethernet & IP Terminating Equipment	6 to 12 years	6 years	8 years
1.3	Customer Sited Transmission Terminating Equipment	11 years	6 years	8 years
1.4	Customer Sited Application Capability Equipment	12 years	4 years	8 years
2	**Access Network – Physical**			
2.1	Poles	15 years	15 years	30 years
2.2	Towers	35 years	35 years	35 years
2.3	Duct, roadway & footway boxes	20 years	20 years	40 years
2.4	Overhead cables & fibre	8 to 10 years	7 to 10 years	15 years
2.5	Underground cables & fibre	14 years	12 to 14 years	20 years
3	**Access Network – Equipment**			
3.1	Active equipment incl. DSLAMs, MSANs in COs or other conditioned areas.	6 to 14 years (majority 11)	6 to 12 years (majority 6-8)	8 years
3.2	Switching: Line terminals	8 years	8 years	8 years
3.3	Active street cabinets & similar external equipment	11 to 22 years	6 to 8 years	8 to 20 years
4	**Core Network – Physical**			
4.1	Poles	8 years	8 years	30 years
4.2	Towers	35 years	35 years	35 years
4.3	Duct, roadway & footway boxes	20 years	20 years	40 years
4.4	Overhead cables & fibre	8 to 10 years	7 to 10 years	15 years
4.5	Underground cables & fibre	14 years	12 to 14 years	20 years
5	**Core Network Transmission Equipment**			
5.1	Transmission equipment < 155Mbit/s	3 to 11 years (majority 11)	3 to 7 years (majority 6 or 7)	11 years
5.2	Transmission equipment >=	6 to 11 years	6 years	11 years

Main Category	Subcategory	Current Useful Economic life - Regulatory Accounts	Current Useful Economic life - Statutory Accounts	Recommended Useful Life
	155Mbit/s			
5.3	International Satellite Equipment	9 years	7 years	9 years
5.4	Submarine cable equipment	8 to 9 years	7 years	9 to 15 years
6	**Data, Ethernet & IP Equipment**			
6.1	IP & Internet Router hardware	6 years	6 years	6 years
6.2	Ethernet Transport & Switch Equipment	9 years	6 years	6 years
6.3	ATM, Frame Relay equipment	6 to 12 years	6 years	6 years
6.4	Other data equipment	9 to 12 years	6 to 7 years	6 to 9 years
7	**Core Network Capability Equipment**			
7.1	Class 4 / 5 switch hardware (excl. line terminals)	6 to 9 years	6 to 7 years	10 years
7.2	Class 4 / 5 switch software	4 to 6 years	4 years	5 years
7.3	Custom hardware & applications	6 to 20 years	6 to 14 years	6 years
7.4	Server hardware	-	-	5 years
7.5	Applications & OS	6 years	5 years	5 years
8	**Network Management Equipment & Network Operations**			
8.1	Network management systems	4 to 9 years	4 to 6 years	4 to 9 years
8.2	Fixed & Exchange Based Test Equipment	5 to 22 years	4 to 8 years	5 to 20 years
9	**Buildings, Mechanical & Electrical Equipment**			
9.1	Land – freehold	Not depreciated	Not depreciated	Not depreciated
9.2	Land - leasehold	Not depreciated	Not depreciated	Not depreciated
9.3	Exchange buildings	40 years	40 years	40 years
9.4	Building fixtures & fittings, security equipment	5 years	5 years	5 years
9.5	Phone / Internet kiosks	8 years	7 years	8 years
9.6	AC & DC power equipment, air conditioning	5 to 22 years	5 to 16 years	5 to 22 years
9.7	Generators	25 years	20 years	25 years
10	**Vehicles**			
10.1	Cars	4 years	4 years	6 years
10.2	Vans	5 years	5 years	6 years
10.3	Trucks	5 years	5 years	6 years

Main Category	Subcategory	Current Useful Economic life - Regulatory Accounts	Current Useful Economic life - Statutory Accounts	Recommended Useful Life
10.4	Specially fitted-out vehicles	5 years	5 years	6 years
11	**IT Systems**			
11.1	IT Hardware	3 to 4 years	4 years	4 to 5 years
11.2	IT Networking equipment	4 years	3 to 4 years	5 years
11.3	IT Applications / software	4 years	4 years	3 to 6 years
12	**Office Equipment**			
12.1	Furniture	Not used	Not used	4 years
12.2	Phones	3 years	3 years	3 years
12.3	PCs & server hardware	4 years	3 years	4 years
12.4	PCs & server software	Not used	Not used	4 years
12.5	Other electrical equipment	4 years	4 years	4 years
13	**Licences & IPR -**			
13.1	Radio Frequency Licences	n/a	25	Duration of licence
13.2	Operator regulatory Licences	n/a	n/a	Duration of licence
13.3	IPR	n/a	n/a	Duration of copyright etc