

REVISED TAL ACCESS MODEL Suriname

May 10-14 2004



Concept of Access

- To the average subscriber in TAL countries access entails more than availability of telephone line. Access should be extended to include local and trunk voice telephony services
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Revision, TAL Access Cost Model

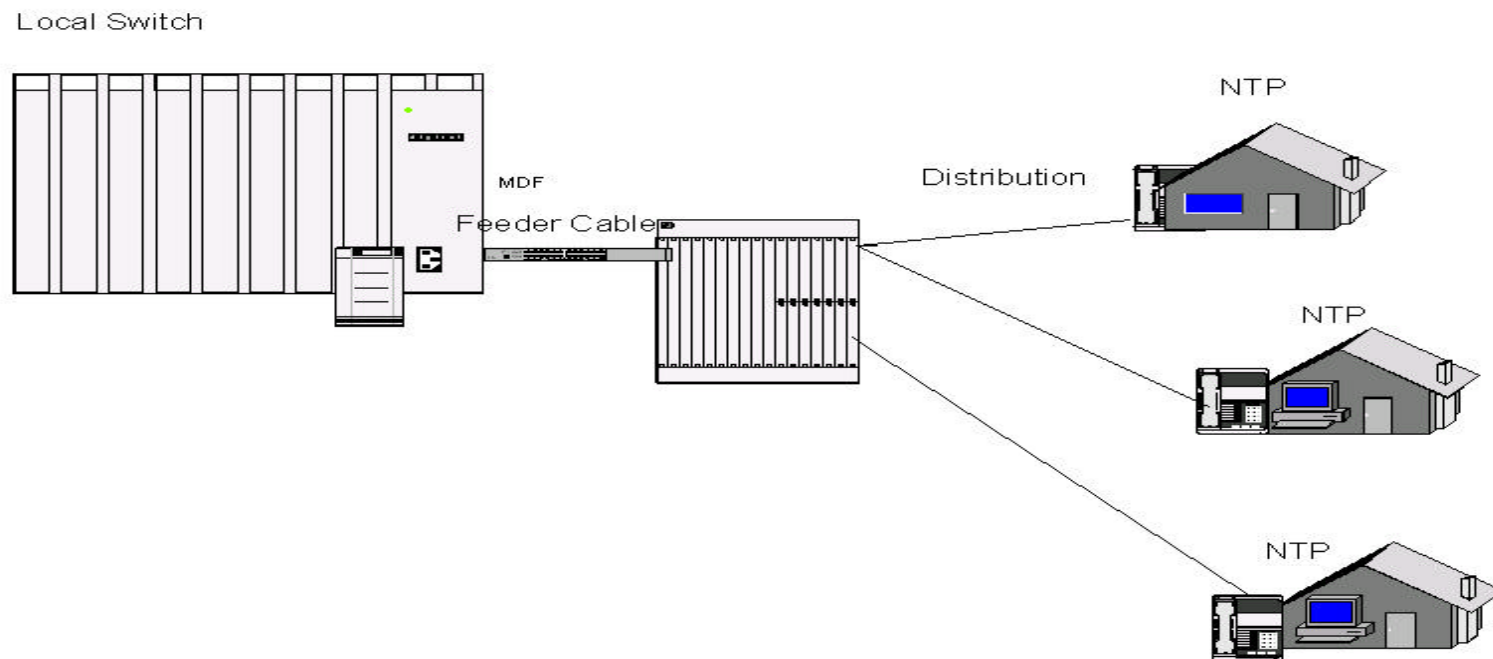
Model amended to estimate:

- *Unit costs of dedicated subscriber line.*
- *Per minute costs basic voice telephony services (of local and trunk).*
- *Access deficit on basic services.*

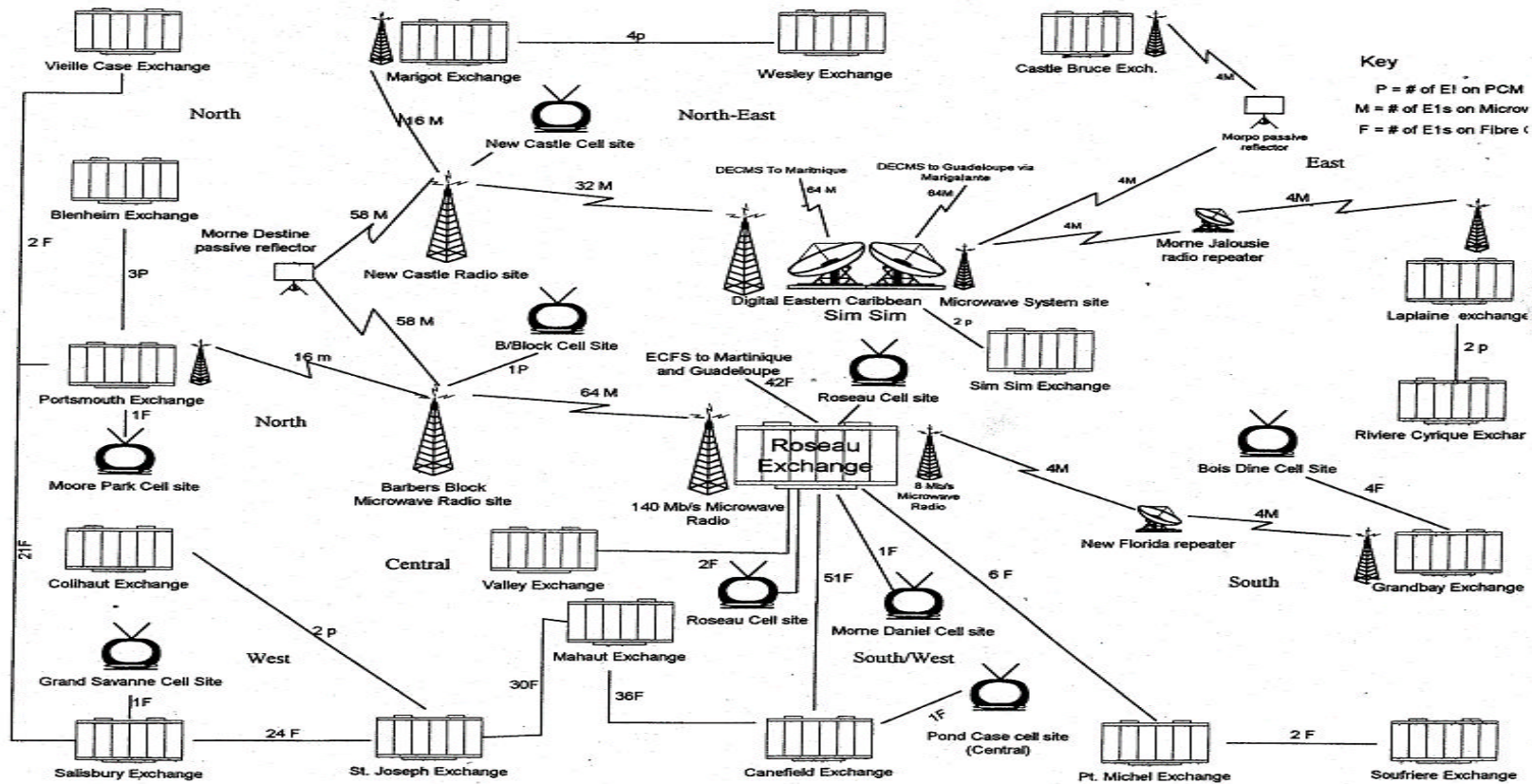
Basic Access Network

Diagram 1

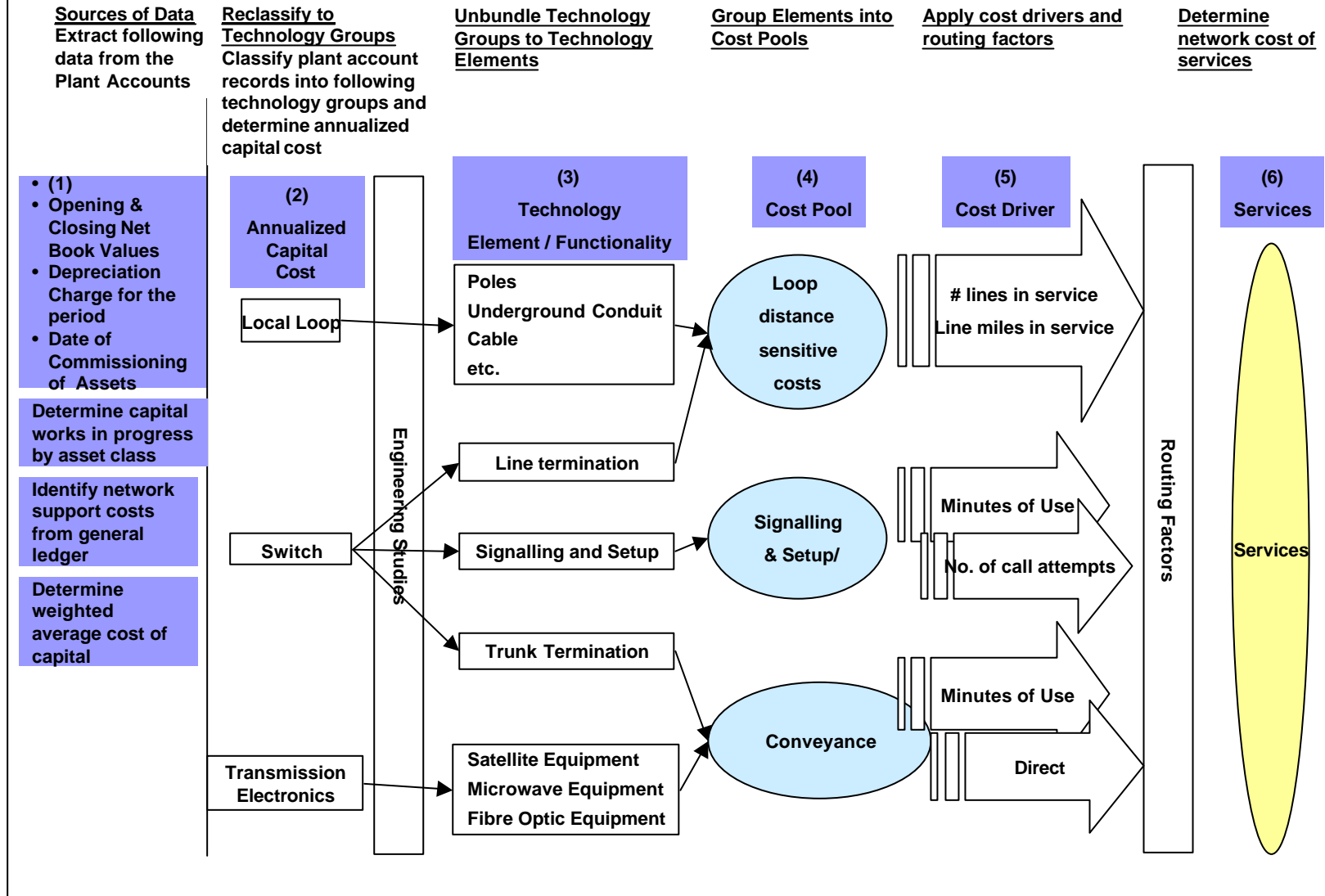
Access Network



National Network



Possible Cost Model Architecture for (PSTN) Fixed Network



Local Loop Inventory



Access Network Inventory				
Component	Urban	Sub Urban	Rural	Remote Rural
1. Average Cable Length (km)				
(i) Distribution				
(ii) Feeder				
2. Average Trench length (km)				
(i) Without adjustment for sharing				
(ii) With adjustment for sharing				
3. Number of pillars				
Line Cards				
Non-traffic sensitive parts of switch				
Proportion of shared site				
Additional Equipment for rural and Remote-rural customers				
Total				

Local Loop Inventory

Cable Distribution	Urban	Sub Urban	Rural	Total	Average
Cable Length					
<input type="checkbox"/> Distribution (km)					
<input type="checkbox"/> Feeder (km)					
Trench Length (km)					
Trench Sharing factor					
Total Trench length (km)					
Number of pillars					

Annualizing Costs

Access Network Component Costs (Investment) Annualized

Component	Purchase Price of Asset.	% Change in Price of Asset	% Exchange Rate Variation	Life of Asset	Adjusted Depreciation Costs
Copper Cable Trench Line Cards Non-traffic sensitive parts of switch Additional Equipment for rural and remote rural customers					
Total Investment Cost					

Depreciation Formula

$$\beta_k = ?k [(1 + ?p - ?e)]$$

Where:

- β_k = Adjustment to current cost
- $?k$ = Depreciation allowance
- $?p$ = % change in price of asset between year of installation and year n
- $?e$ = % change in value of currency between year of asset purchase and year n.

- This formula should give similar results as that detailed in COSITU:
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- (ii) $ACC = AMO [(1+t)^{D/2} / (1-e)^{D/2} - 1]$
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- Where:
- ACC = adjustment to current cost
- AMO = amortization allowance
- t = annual average growth rate in price of equipment
- $D/2$ = depreciation period divided by 2
- e = average annual rate in currency depreciation

Current Cost Adjustment

Effect of Exchange rate adjustment on cost may be estimated by:

$$C_{AD} = D_A [(1+t)^{DP/2} / (1-e)^{DP/2} - 1]$$

Where:

C_{AD} = Adjustment to current cost;

D_A = Depreciation allowance;

t = Average annual variation in equipment price;

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$DP =$ Depreciation period;

$e =$ Average per annum rate in currency movement.

Cost of Capital

Combined effect of debt and equity

- (i) Creditors demand interest
- (ii) Owners demand dividends

Firms normally raise capital through:

- Long term & short term debt
- Sale of Preferred stock
- Sale of common stock
- Retained earnings

These cost are basic determinants of the cost of capital.

Cost of Debt

Cost of debt is determined by:

- *Interest rate* on debt; *subject to:*
- *Adjustment for taxes* where interest payment on debt are deductible for income tax purposes.
- After tax cost of debt can be expressed as:
(interest rate) * (1- tax rate)
- E.g. If interest rate is 9% and tax rate of 25%
- The after tax cost of debt = $(0.09) * (1 - 0.25)$
= 0.0675

Marginal Cost of Debt

Cost of debt should be calculated at marginal cost:

- *Current interest rates* on the market
- Taking into account *interest rates on similar enterprise on the international market*

Cost of Equity

- ***Required rate of return (s) on the common stock of the firm***
- Firms use ***Expected rate of return***.
- The Expected Rate of return on a stock is a ***risky variable***.
- $s = \text{risk-free rate of return } (R_F) + \text{Risk Premium } (R_P)$.
- R_F is normally reflective of interest on ***government security***.
- R_P is the ***difference*** between the required rate & risk free rate of return

- $R_F = f(\textit{rate on government securities})$
- $R_P = f(\textit{different methodology of estimation})$
- Interest on firms long term bonds (i_C) + a percentage-points addition based on historical returns per year on the financial market (i_A). Let R_F, i_C & i_A be 6%, 9% and 5% respectively:
- $i_C + i_A = (0.09 + 0.05) = 0.14$
- $R_P = 0.14 - 0.06 = 0.08$
- $s = 0.14$

Jeorgenson Method

□ The cost of capital d is calculated using the formula:

$$\bullet \quad d = \frac{D}{D + E} i^* (i - t) + \frac{E}{D + E} s$$

Where:

D = amount of medium and long term debt;

s = before tax return on capital;

E = equity; and

i = average interest rate.

t = rate of corporation tax.

Estimating Demand

- **iii). $D^a = L_n + L_n^*$**
- Where:
- L_n = Number of existing lines as indicated at Table IV
- L_n^* = unfulfilled request for line installation
-
- Potential demand D^p is given as:
-
- **(iv). $D^p = D^a$**
-

Where:

- $a =$ a factor for long run growth in demand for lines.

Therefore total demand for lines (D^t) is:

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- **(v). $D^t = D^a (1+a)$**

Estimating Unit Cost

- Long Run Average Total Cost (LRATC) per line is the ratio: total cost/total demand for lines:
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- **(v). $LRATC = ATC / D^t$**

Efficiency Adjustment

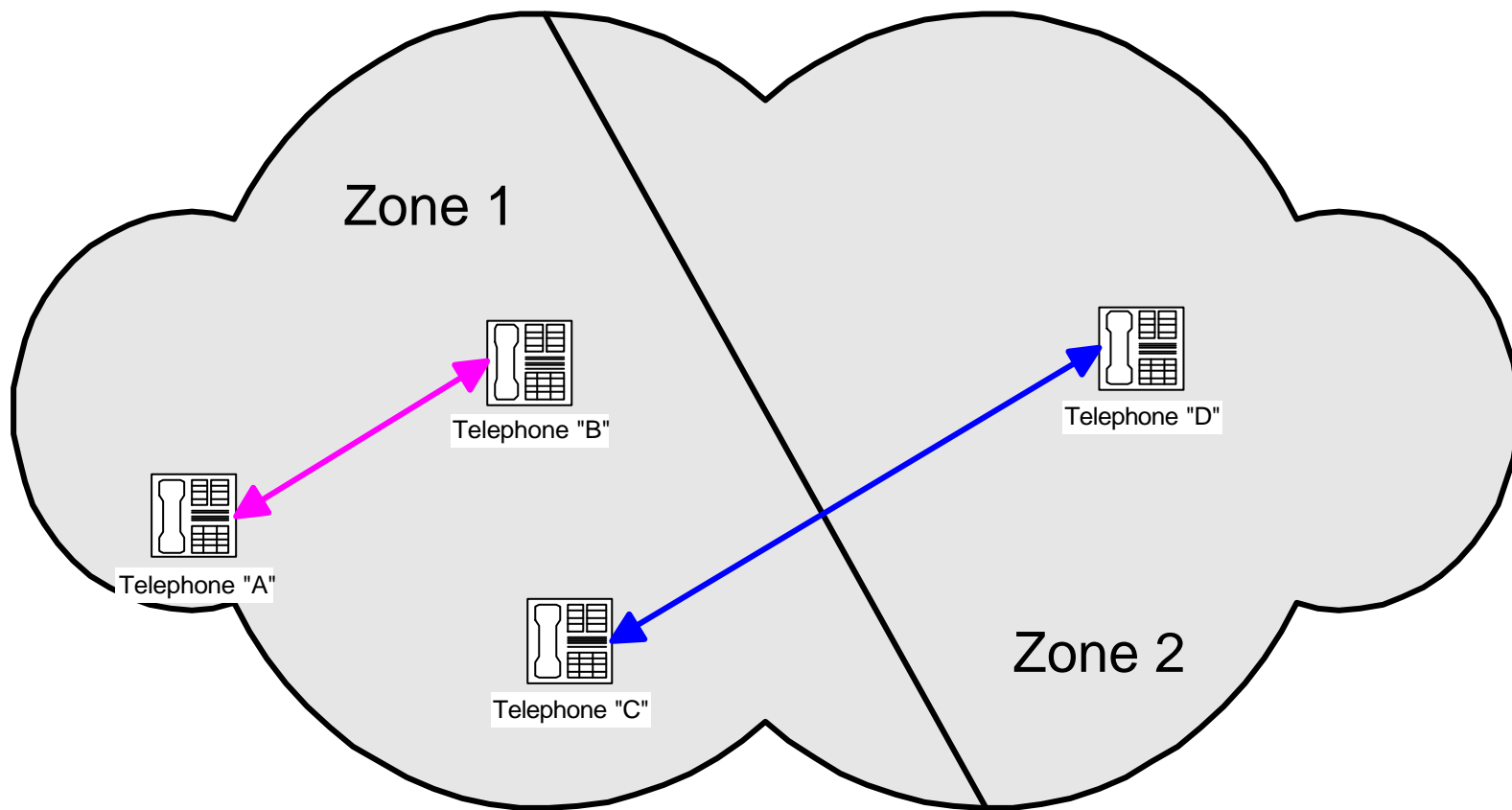
- **$LRATC = \frac{ATC(1-\beta)}{D^t}$**
- **D^t**
- **Where β is the adjustment factor for excess capacity. Since the situation in most countries of the Americas is excess demand for subscriber lines, the efficiency factor in COSITU is sufficient**

Local/urban Tariff

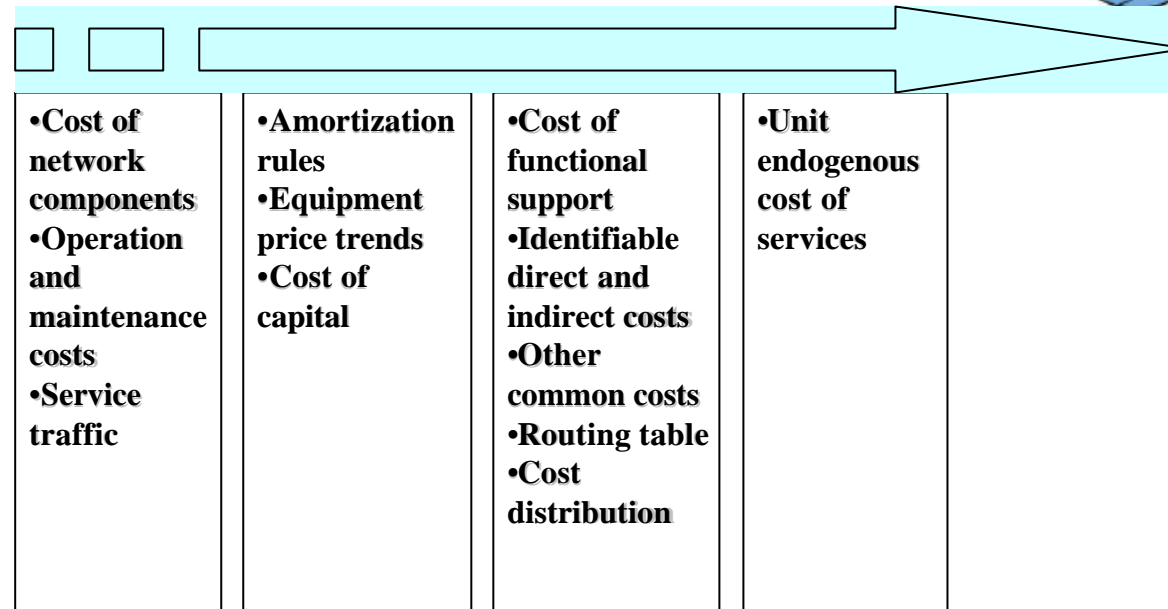
- **Local/Urban:** tariff levied by operators on end users for traffic carried between consumers who are located in the same local charging area and where such traffic is carried end-to-end on the network of the operator imposing the charge for the service

Long Distance Tariff

- **Trunk/Inter Urban:** tariff levied by operators on end users for traffic carried between consumers who are located in different local charging areas and where such traffic is carried end-to-end on the network of the operator imposing the charge for the service.
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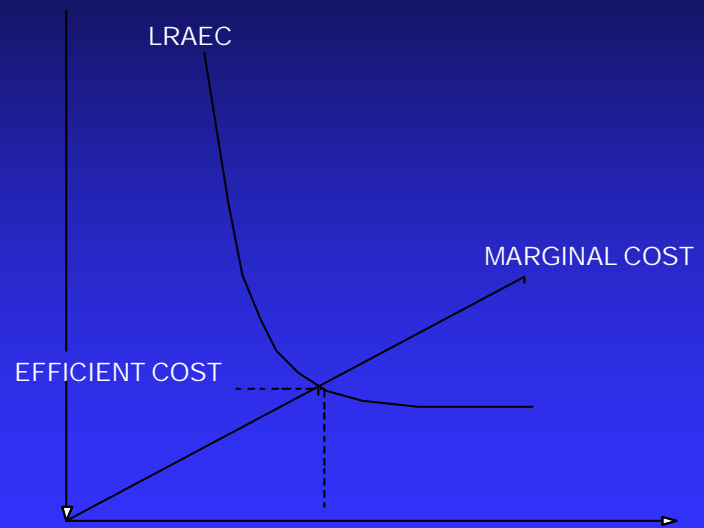
Stages of cost-orientated Unit Costs



Two Basic Costing Principles

- **Causality:**
 - The demonstration of a clear cause-and-effect relationship between service delivery, on the one hand, and the network elements and other resources used to provide it, on the other hand, taking account of relevant cost determinants (cost inducers/drivers).
- **Efficiency:**
 - The provision of a forecast of cost reductions that result from a more efficient combination of resources.

The Economics of LRAEC



Parent Formula

- General LREC formula:
- $C = A(\beta)/M^o$
- Where:
- C = per minute cost of traffic
- A = total cost (direct, indirect and common)
- β = Efficiency factor = x/y
- x = required capacity
- y = installed capacity
- M^o = traffic throughput.

Cost Adjustment?

- Historical costs: Based on the cost price of equipment and services,
- Current costs: Take account of the changing environment: falling prices of telecommunication equipment, currency depreciation. The TAL Model utilizes current costs as confirmed on the relevant market.

Clarity re consistency with Fundamental Costing Principles

- *Parent TAL formula:*
- $C = A(\beta)/M^0$
- $LEC = (A/M^0) * (\Sigma \infty)$
- The efficiency factor ∞ , is estimated in terms of adjustment in OPEX and or adjustment for avoidable excess network capacity.

Operating and maintenance costs

Cost of inputs

✓ *Purchases and variations in stock;*

✓ *Transport;*

✓ *Outside services*

Personnel costs

Taxes and levies (corporation Tax not included)

Other charges

Other Financial and similar charges

Operating provisions

Network Efficiency (N_e)

- $N_e = t_c + t_{c+1} - ? = 0$

Where:

➤ t_c is **Current traffic**;

➤ t_i is **Expected traffic** where $i = 1$ to n ;

➤ $?$ is **Network capacity**.

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Evaluating Total Efficiency Factor

- Same as TAL Parent & Interconnect Models.

Avoidable/Unavoidable Excess Capacity
Same Principles as TAL model are
applicable.

Unit Cost of Local/Urban traffic

$$A_{mj} = \frac{TC^j \times \bar{\omega}_j}{TD_{mj}}$$

Where:

- A_{mj} = LEC unit cost of local/urban traffic;
- TC^j = % of total cost of local and remote switching dedicated to local traffic;
- TD_{mj} = Total minutes of local/urban traffic over local and remote switches; and
- $\bar{\omega}_j$ = Network efficiency factor.
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Unit Cost of Trunk Traffic

$$A_{mt} = \frac{TC^t \times \omega_j}{TD_{mt}}$$

Where:

A_{mt} = LEC unit cost of trunk/interurban traffic;

TC^t = % of total cost of local, remote and tandem switching plus transmission facilities dedicated to trunk/interurban traffic;

TD_{mt} = Total minutes of trunk/interurban traffic;

ω_j = Network efficiency factor.

COSITU REVISION

- Both formulae are to be included in COSITU.

Estimating Local Loop Deficit

- $(ATC/D^t) - (?N_S * C_c + M_{sf} * N_S * 12)$
- Where:
- C_c = connection charge
- M_{sf} = monthly subscription
- N_S = **number of subscribers**
- $?N_S$ = **growth in the number of subscribers**

Estimating Access Deficit on Urban traffic

- (x). $A_{mj} = \frac{TC^j \times \bar{\omega}_j}{TD_{mj}} - P_L$
-
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- Where:
- P_L = price per minute of a local call.
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Estimating Deficit on Trunk Tariff

$$A_{mj} = \frac{TC^j \times \bar{\omega}_j}{TD_{mj}} - P_L$$

Where:

- P_L = price per minute of a local call.

Thank You