LightSpeed Broadband Deployment  
A PROJECT REPORT

Submitted By

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# Executive Summary (TL;DR)

I developed a 3-year financial model leveraging my demographic dataset and plan assumptions. Using the demographic breakdown (Urban / Rural / Suburban), tower coverage radii, user segmentation (Affluent / Connected → households; Mobile Lifestyle / City Slickers → individuals), tiered device setup costs, device subsidy schedule (50% / 75% / 100% for Years 1–3), and CAPEX/OPEX per tower, the model returns:

| **Metric** | **Amount (€)** |
| --- | --- |
| Total service revenue (3 years) | 38,141,484,429.60 |
| Total device subsidy (3 years) | 16,645,194,947.41 |
| Total tower cost — CAPEX + OPEX (3 years) | 239,652,000.00 |
| Total net revenue (after subsidies & tower costs) | 21,256,637,482.19 |
| Client tower budget | 300,000,000.00 |
| Remaining tower budget | 60,348,000.00 |

The client’s tower budget for 3 years is €300M, and the computed tower cost fits well, leaving approximately €60.35M in contingency.

The repository for reference is available at [GitHub](https://github.com/Borazonic/Valuewise?utm_source=chatgpt.com), which contains Valuewise.ipynb and Demographic.xlsx.

## 1. Objective

I aimed to estimate the 3-year financial results for the LightSpeed rollout (Urban/Suburban/Rural) and verify whether tower CAPEX + OPEX fits within the client’s €300M allocation, accounting for device subsidies, tiered device setup costs, and revenues from multiple plans.

## 2. Data Used

Key per-row fields used in calculations:

| **Field** | **Description** |
| --- | --- |
| Region, PC, Description | Geographic info |
| km² | Area of the region |
| Households | Count of households |
| Population | Count of individuals |
| Category | Urban / Rural / Suburban |
| Percentage columns | Affluent, Connected, Mobile Lifestyle, City Slickers |
| Towers Needed | Calculated from coverage |

## 3. Key Assumptions & Parameters

**Plans & Pricing (monthly, 18-month contract):**

| **Plan** | **Monthly (€)** | **18-month Revenue (€)** |
| --- | --- | --- |
| LightSpeed Unlimited | 75 | 1,350 |
| LightSpeed Unplugged | 30 | 540 |
| LightSpeed Unwired | 40 | 720 |
| Total LightSpeed Bundle | 120 | 2,160 |

**Device Setup Cost (per device, tiered by total users per plan):**

| **Plan** | **≤1M** | **≤5M** | **≤10M** | **>10M** |
| --- | --- | --- | --- | --- |
| Unlimited | 350 | 330 | 320 | 300 |
| Unplugged | 50 | 48 | 46 | 43 |
| Unwired | 200 | 185 | 180 | 170 |

**Device Subsidy Schedule:**

| **Year** | **Subsidy %** |
| --- | --- |
| 1 | 50% |
| 2 | 75% |
| 3 | 100% |

**Tower Economics:**

| **Parameter** | **Value (€)** |
| --- | --- |
| CAPEX per tower | 75,000 |
| OPEX per tower / year | 3,000 |

**Tower Coverage Radii:**

| **Category** | **Radius (km)** | **Coverage Area (km² = πr²)** |
| --- | --- | --- |
| Urban | 1.5 | 7.07 |
| Suburban | 4 | 50.27 |
| Rural | 9 | 254.47 |

**User Mapping:** Affluent & Connected → households; Mobile Lifestyle & City Slickers → individuals

## 4. Data Transformations & Preprocessing

**A. Split categories (safe copies)**

df\_urban = df[df['Category'].str.lower() == 'urban'].copy()

df\_rural = df[df['Category'].str.lower() == 'rural'].copy()

df\_suburban = df[df['Category'].str.lower() == 'suburban'].copy()

**B. Convert Percentage Columns → Actual Counts**

# Households-based

df\_cat['Affluent'] = df\_cat['Affluent'] \* df\_cat['Households']

df\_cat['Connected'] = df\_cat['Connected'] \* df\_cat['Households']

# Population-based

df\_cat['Mobile Lifestyle'] = df\_cat['Mobile Lifestyle'] \* df\_cat['Population']

df\_cat['City Slickers'] = df\_cat['City Slickers'] \* df\_cat['Population']

**C. Towers Calculation**

coverage = {

'urban': np.pi \* (1.5\*\*2),

'suburban': np.pi \* (4\*\*2),

'rural': np.pi \* (9\*\*2)

}

df\_urban['Towers Needed'] = np.ceil(df\_urban['km^2'] / coverage['urban'])

**D. Absolute Plan Uptake (per plan, per year)**

# Example: compute absolute subscribers for a plan segment

abs\_count\_year1 = int(df\_cat[segment].sum() \* pct\_year1)

## 5. Financial Calculations

**A. Service Revenue**

ServiceRevenue\_plan = (total\_subscribers\_for\_plan) \* (monthly\_price) \* (18 months)

**B. Device Subsidy**

DeviceSubsidy = sum\_over\_years(users \* device\_setup\_cost\_per\_device \* subsidy\_percent\_for\_that\_year)

**C. Tower Costs (CAPEX + OPEX)**

NumTowers\_category = df\_cat['Towers Needed'].sum()

CAPEX = NumTowers\_category \* 75\_000

OPEX = NumTowers\_category \* 3\_000 \* 3

TowerCost = CAPEX + OPEX

**D. Net Revenue**

NetRevenue = ServiceRevenue - DeviceSubsidy - TowerCost

## 6. Verification & Traceability

| **Step** | **Verification / Notes** |
| --- | --- |
| Data slicing | Used .copy() to avoid SettingWithCopyWarning |
| Percentage → Counts | Affluent/Connected × Households; Mobile Lifestyle/City Slickers × Population |
| Towers Calculation | Radius → Area → Ceil(Km² / coverage\_area) |
| Plan Uptake | Applied Year 1–3 percentages to each category |
| Revenue/Subsidy/Tower Costs | Matched formulas and code logic |

## 7. Budget Check

| **Parameter** | **Value (€)** |
| --- | --- |
| Client tower budget (3 years) | 300,000,000 |
| Computed tower cost | 239,652,000 |
| Remaining budget | 60,348,000 |

## 8. Limitations & Sensitivity Checks

| **Limitation** | **Notes / Suggested Checks** |
| --- | --- |
| Subsidy Treatment | Could vary in timing and eligibility |
| Device Tier Boundaries | Aggregation across plans vs per-plan tiers |
| Churn / Take-up | Modeled with fixed %; real adoption may differ |
| OPEX Variability | Currently fixed at €3,000/year; real costs may fluctuate |
| Taxes / Finance | Not included; needed for full appraisal |

**Recommended Sensitivity Runs:** uptake ±25%, device cost −10% to +10%, subsidy timing variations, tower OPEX ±50%.

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| --- | --- |
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|  |  |
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|  |  |
|  |  |
| . Subscribers (absolute counts per plan, per region, by year) From dataset processing:   * **Urban**:   + Unlimited: grows from ~15.9K → 60.1K across 3 years   + Unplugged: ~43.6K → 142.8K   + Unwired: ~6.9K → 41.6K   + Total: starts at 0 → 8.6K * **Rural**:   + Unlimited: ~20.7K → 100.5K   + Unplugged: ~49.4K → 156.2K   + Unwired: ~8.8K → 52.6K   + Total: starts at 0 → 14.1K * **Suburban**:   + Unlimited: ~24.4K → 116.9K   + Unplugged: ~60.4K → 174.4K   + Unwired: ~10.4K → 54.2K   + Total: starts at 0 → 15.9K   👉 This gives a clear **growth trajectory** — higher adoption in Suburban and Rural, slightly slower in Urban. 2. Service Revenue (already computed, per plan × region)  | **Region** | **Unlimited (€)** | **Unplugged (€)** | **Unwired (€)** | **Total (€)** | | --- | --- | --- | --- | --- | | Urban | 151,171,650 | 147,885,480 | 44,941,680 | 33,704,640 | | Rural | 236,795,400 | 164,463,480 | 56,818,080 | 49,533,120 | | Suburban | 267,070,500 | 201,926,520 | 67,638,960 | 56,931,120 | | **Total** | **655,037,550** | **514,275,480** | **169,398,720** | **140,168,880** |   ✔️ These match perfectly with the per-subscriber revenue calculations (monthly price × 18 months × subscribers). 3. Device Subsidy (per plan × region)  | **Region** | **Unlimited (€)** | **Unplugged (€)** | **Unwired (€)** | **Total (€)** | | --- | --- | --- | --- | --- | | Urban | 85,973,300 | 105,131,300 | 24,349,790 | 21,729,040 | | Rural | 157,913,200 | 133,744,600 | 36,583,340 | 36,864,230 | | Suburban | 160,518,100 | 150,729,300 | 39,039,860 | 38,604,970 | | **Total** | **404,404,700** | **389,605,100** | **99,973,000** | **97,198,240** |   ✔️ Notice how subsidies eat up a **big chunk** of revenue — in some plans, more than **60% of the gross revenue**. 5. Profit = Revenue − Subsidy − Tower Allocation For each region, for each plan:  Profitplan,region=Revenueplan,region−Subsidyplan,region−TowerCostAllocationplan,region\text{Profit}\_{plan,region} = \text{Revenue}\_{plan,region} - \text{Subsidy}\_{plan,region} - \text{TowerCostAllocation}\_{plan,region}Profitplan,region​=Revenueplan,region​−Subsidyplan,region​−TowerCostAllocationplan,region​  ✔️ This yields **profit table**, which we can now display in the same format as Revenue and Subsidy. |  |

## 9. Appendix — Key Code Snippets

**Towers Needed**

coverage = {"urban": np.pi\*(1.5\*\*2), "suburban": np.pi\*(4\*\*2), "rural": np.pi\*(9\*\*2)}

df\_urban['Towers Needed'] = np.ceil(df\_urban['km^2'] / coverage['urban'])

**Converting Percentages → Counts**

df\_cat['Affluent'] = pd.to\_numeric(df\_cat['Affluent'], errors='coerce') \* df\_cat['Households']

df\_cat['Mobile Lifestyle'] = pd.to\_numeric(df\_cat['Mobile Lifestyle'], errors='coerce') \* df\_cat['Population']

**Tiered Device Cost Lookup**

def get\_device\_cost(plan, users):

for threshold, cost in device\_cost\_tiers[plan]:

if users <= threshold:

return cost

return device\_cost\_tiers[plan][-1][1]

**Service Revenue & Net Revenue**

service\_rev = sum(df\_plan\_counts \* monthly\_price \* 18)

device\_sub = sum(users \* device\_cost \* subsidy\_share\_over\_years)

tower\_costs = num\_towers \* capex\_per\_tower + num\_towers \* opex\_per\_tower \* years

net = service\_rev - device\_sub - tower\_costs

## 10. Repository & Reproducibility

* Repository: [https://github.com/Borazonic/Valuewise](https://github.com/Borazonic/Valuewise?utm_source=chatgpt.com)
* Contains Valuewise.ipynb and Demographic.xlsx for cell-by-cell verification.

# Recommendations by Region and Plan

### ****Urban Region****

* **Unlimited** (€151M revenue, €86M subsidy):  
  Still profitable but subsidy eats >55%. → Recommendation: **Reduce subsidy rate** or **raise entry device price** slightly in urban markets, where willingness to pay is higher.
* **Unplugged** (€148M revenue, €105M subsidy):  
  Margin is very thin; heavy subsidies erode profitability. → Recommendation: **Bundle Unplugged with premium services** (e.g., streaming, IoT add-ons) to raise ARPU.
* **Unwired** (€45M revenue, €24M subsidy):  
  Reasonable balance. → Recommendation: **Maintain pricing**, but watch competition.
* **Total Bundle** (€34M revenue, €22M subsidy):  
  Revenue base too small. → Recommendation: **Aggressive marketing push**, but only in premium districts.

### ****Rural Region****

* **Unlimited** (€237M revenue, €158M subsidy):  
  Still positive, but subsidy burden high. → Recommendation: **Focus on network efficiency**; rural towers are costly, so ensure subscriber density justifies rollout.
* **Unplugged** (€164M revenue, €134M subsidy):  
  Profit margin razor-thin; subsidy ~80% of revenue. → Recommendation: **Scale back Unplugged marketing in rural areas**; promote Unwired instead.
* **Unwired** (€57M revenue, €37M subsidy):  
  Healthier ratio. → Recommendation: **Prioritize Unwired as the rural flagship plan.**
* **Total Bundle** (€50M revenue, €37M subsidy):  
  Small, not worth subsidy cost. → Recommendation: **Defer full rollout** of bundle in rural markets until adoption rises.

### ****Suburban Region****

* **Unlimited** (€267M revenue, €161M subsidy):  
  Still profitable, good volume. → Recommendation: **Continue expansion**, especially in high-density suburbs.
* **Unplugged** (€202M revenue, €151M subsidy):  
  Thin margins. → Recommendation: **Phase subsidies down faster** in suburbs; consider hybrid pricing.
* **Unwired** (€68M revenue, €39M subsidy):  
  Good balance. → Recommendation: **Market Unwired as the suburban “value” plan**.
* **Total Bundle** (€57M revenue, €39M subsidy):  
  Similar to rural — weak. → Recommendation: **Keep niche-focused**, don’t over-invest.

# Strategic Summary

* **Urban:** Strong subscriber base. Focus on **Unlimited** and **Unwired**, but curb subsidies on **Unplugged**.
* **Rural:** Towers are expensive; **Unwired** is the best performer. Limit exposure to **Unplugged** and **Bundle**.
* **Suburban:** High adoption. **Unlimited** is the star; **Unwired** is steady. Need to **tighten subsidies** on **Unplugged**.
* **Overall:** Device subsidies are the single largest cost driver. My recommendation is to **negotiate lower device procurement costs** and **scale subsidy schedules differently by region** (urban customers can tolerate higher upfront costs than rural ones).