Project Report: Customer Churn & Retention Analysis (RFM Customer Segmentation Analysis)

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1. Executive Summary

This project was initiated to analyze an alarmingly high **26.6%** customer churn rate. The analysis revealed that this churn is **not** a widespread, random problem but is highly concentrated within a specific, high-risk customer segment. The primary drivers of churn are a combination of product, contract, and customer tenure.

The root cause is an unstable **Fibre Optic service** (41.7% churn) offered to **Month-to-Month** customers (42.7% churn), who are most vulnerable in their first **0-12 months** of service. This combination of an unstable premium product and a low-friction contract creates a "perfect storm" for churn.

This report recommends a 3-point strategic plan to address this:

1. **Immediate:** Improve the onboarding support for new Fiber Optic customers.
2. **Short-Term:** Launch a marketing campaign to convert this high-risk group to 1-year contracts.
3. **Long-Term:** Initiate a technical Root Cause Analysis (RCA) with the Operations team to fix the underlying Fiber Optic service instability.

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2. Project Objective & Scope

2.1. Objective

The primary objective of this project was to move beyond the top-level 26.6% churn metric to:

- Identify the key demographic, service, and contract drivers of customer churn.
- Prove or disprove the hypothesis that churn is concentrated in a specific segment.
- Develop a data-driven, actionable retention strategy for the business.

2.2. Scope

- **In Scope:** Analysis of the CustomerData table (7,043 customers), hypothesis testing using SQL, data cleaning and feature engineering with Python, and the creation of an interactive Power BI dashboard and final recommendation report.
- **Out of Scope:** This analysis did not include external competitor pricing, network infrastructure (IT) diagnostics, or live call-center log analysis. It focused on identifying *what* is happening, to guide the *next* phase of technical investigation.

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3. Methodology & Tools Used

This project followed a 4-phase methodology, utilizing a full business analytics technology stack.

1. **Phase 1: Database Investigation (SQL)**
    - **Tool:** MySQL Workbench
    - **Action:** The raw dataset (telecom_data.csv) was loaded into a new database (TelecomDB).
    - **Analysis:** Exploratory SQL queries were executed to test the core business hypothesis. This confirmed that Contract, InternetService, and tenure were the most significant factors.
2. **Phase 2: Data Preparation (Python)**
    - **Tool:** Python (Pandas library in a Jupyter Notebook)
    - **Action:** A script was written to prepare the data for visualization.

    - **Data Cleaning:** Fixed the "dirty" TotalCharges column. It was imported as text due to blank spaces, which were converted to NaN using pd.to_numeric(errors='coerce') and then removed using dropna().
    - **Feature Engineering:** Created a new, business-friendly TenureGroup column ("New", "Established", "Loyal") using the pd.cut() function. This was critical for simplifying the analysis for a non-technical audience.
3. **Phase 3: Visualization (Power BI)**
    - **Tool:** Power BI Desktop
    - **Action:** The final telecom_cleaned.csv file was loaded into Power BI.
    - **Analysis:** DAX measures were written to define the primary KPIs: Total Customers, Total Churn, and Churn Rate = DIVIDE([Total Churn], [Total Customers]).
    - **Deliverable:** A 1-page executive dashboard was built to tell a clear story.
4. **Phase 4: Business Recommendation**
    - **Tool:** Business Analysis Frameworks
    - **Action:** The data story from the dashboard was translated into a formal 3-point business plan (see Section 6).

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4. Key Data Findings

The analysis of the 7,032 customers provided the following clear, statistically significant findings:

- **Finding 1 (Contract):** Customers on **Month-to-Month** contracts have a **42.7%** churn rate. This is 15x higher than 2-Year Contract customers (2.8% churn).
- **Finding 2 (Service):** Customers with **Fiber Optic** service have a **41.7%** churn rate. This is more than double the churn of DSL customers (18.9%) and four times that of customers with no internet (7.4%).

- **Finding 3 (Tenure):** Churn is heavily skewed toward new customers. The **"New (0-12 mo)"** group had the highest churn rate by a significant margin.
- **Finding 4 (The "Root Cause"):** When combined, the churn rate for **new, month-to-month, Fiber Optic customers is over 60%**. This proves the hypothesis and pinpoints the exact source of the problem.

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5. Root Cause Analysis (The "Why")

The findings tell a clear story: The problem is not a general failure but a specific product and process failure. Our most expensive, high-tech product (Fiber Optic) is likely unstable or difficult to install, causing massive frustration for new customers.

Because these customers are also on a Month-to-Month contract, there is **zero friction** for them to leave. They are trying our "best" product, having a bad experience, and quitting immediately. We are effectively losing our highest-potential customers at the very start of their journey.

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6. Business Recommendations (The "What Next?")

Based on the data, a general-purpose "retention plan" will fail. I recommend a targeted, 3-point strategic plan.

1. **Immediate Action (Support):**
    - **What:** Automatically include our "Premium Tech Support" package **for free** for the first 12 months for all *new* Fiber Optic customers.
    - **Why:** This adds a proactive, high-touch support layer to manage their frustration and guide them through the (currently unstable) onboarding period.
2. **Short-Term Action (Marketing):**
    - **What:** Launch a targeted email campaign to all *existing* "Month-to-Month Fiber" customers (tenure 6-12 months) offering a 10% discount to convert them to a "1-Year Contract."

    - **Why:** This builds a "retention wall" to prevent them from leaving and gives us another year to stabilize the service and prove our value.
3. **Long-Term Action (Operations):**
    - **What:** Initiate a formal **Root Cause Analysis (RCA)** with the Operations and IT teams to find the technical reason for the Fiber Optic instability.
    - **Why:** My data shows *what* is happening, but the company must find the technical "why." This is essential for fixing the root of the problem.

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7. Appendix: Power BI Dashboard Overview

The final dashboard, Churn_Dashboard.pbix, summarizes these findings on a single page.

- **Headline:** Customer Churn & Retention Dashboard
- **KPI Cards:**
    - Total Customers: 7,032
    - Total Churn: 1,869
    - Churn Rate: 26.6%
- **Key Visuals:**
    1. **Bar Chart: Churn Rate by Internet Service** (Clearly shows the 41.7% Fiber Optic problem).
    2. **Bar Chart: Churn Rate by Contract** (Clearly shows the 42.7% Month-to-Month problem).
    3. **Bar Chart: Churn Rate by TenureGroup** (Clearly shows the "New (0-12 mo)" problem).
    4. **Matrix (Heatmap): Churn Rate by TenureGroup (Rows) and InternetService (Columns)** (This is the "smoking gun" visual, showing a bright red box for "New" / "Fiber Optic" customers).