Bitcoin Difficulty Adjustment Calculation

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1. Block Information

1.1 Current Block: 857,485

1.2 Identifying the Block Where Difficulty Changed

Total Blocks: 857,485
Blocks Per Difficulty Adjustment Period: 2,016
Number of Periods: **857,485 / 2,016 = 425**
Difficulty Changed at Block: **425 × 2,016 = 856,040**

1.3 Identifying the Previous Difficulty Adjustment Block

Last Difficulty Adjustment Block: 856,040
Previous Difficulty Adjustment Block: **856,040 - 2,016 = 854,024**

2. Block Data

2.1 Block 856,800

Bits: **386,088,310**
Difficulty: **86,871,474,313,762**
Timestamp: **14 Aug 2024 22:12:19 UTC**
UNIX Timestamp: **1723673539**

2.2 Block 854,784

Bits: **386,079,422**
Difficulty: **90,666,502,495,566**
Timestamp: **31 Jul 2024 08:50:18 UTC**
UNIX Timestamp: **1722415818**

3. New Difficulty Calculation

3.1 Formula

$$\text{New Difficulty} = \text{Old Difficulty} \times \left(\frac{\text{Expected Time}}{\text{Actual Time}}\right)$$

3.2 Values

Old Difficulty (Block 854,784): **90,666,502,495,566**
Expected Time: **1,209,600 seconds (14 days)**
Actual Time: **1,257,721 seconds**

3.3 Calculation

$$\text{New Difficulty} = 90,666,502,495,566 \times \left(\frac{1,209,600}{1,257,721}\right)$$

$$\text{New Difficulty} \approx 90,666,502,495,566 \times 0.9627 \approx 87,289,833,101,389$$

3.4 Comparison with Actual Difficulty

Calculated New Difficulty: **87,289,833,101,389**
Actual Difficulty (Block 856,800): **86,871,474,313,762**

3.5 Detailed Calculations

The detailed calculation for the new difficulty is as follows:

1. **Calculate the actual time taken for mining the last 2016 blocks**:

$$\text{Actual Time} = 1723673539 - 1722415818 = 1,257,721 \text{ seconds}$$

2. **Calculate the ratio of expected to actual time**:

$$\text{Ratio} = \frac{1,209,600}{1,257,721} \approx 0.9627$$

3. **Calculate the new difficulty**:

$$\text{New Difficulty} = 90,666,502,495,566 \times 0.9627 \approx 87,289,833,101,389$$

4. **Compare with the actual difficulty at Block 856,800**:

$$\text{Actual Difficulty} = 86,871,474,313,762$$