

BlueStar 5G Communications Index

Index Methodology Guide 1.1

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Chapter 1: Introduction and Index Description

This document summarizes the methodology and rules used to construct, calculate, and maintain the BlueStar 5G Communications Index (“BFIVG”).

BFIVG is a rules-based index that tracks the performance of a group of US-listed stocks of global companies involved in a range of industries, collectively defined by BlueStar Indexes as 5G Communications companies. Index components are reviewed semi-annually for eligibility, and weights are re-set according to a tiered modified market capitalization weighting strategy.

Companies may not apply and may not be nominated for inclusion in the Index. Companies are added or removed by BlueStar based on the methodology described herein. The BlueStar Index Advisory Committee advises on index methodology construction and adherence to the methodology guide as it relates to decisions on which companies shall be considered 5G Communications companies. The BlueStar Index Advisory Committee serves a strictly advisory function and is not responsible for making decisions on which companies to add or remove from the Index. Whenever possible, BlueStar will publicly announce changes to the index on its website at least five trading days in advance of the actual change. The Index is calculated and maintained by Solactive AG based on a methodology developed by BlueStar.

BFIVG is calculated on a price and total return basis in real-time. The total return index is disseminated in real-time via the price marketing services of Boerse Stuttgart AG every day the exchange of at least one index component is open. Real-time index values for the total return index are available on Bloomberg by entering “BFIVGTR INDEX <GO>”, and end-of-day values are freely available on BlueStar’s or Solactive’s website, www.bluestarindexes.com and Solactive.com, respectively, and/or through market data vendors.

Chapter 2: Index Construction

This chapter outlines and defines the key steps in constructing and calculating the index, including: eligibility requirements, formulas, initial component selection, and special adjustments

2.1 Base Date and Value

BFIVG has the following variants, base dates and values:

Name	Index Symbol	Base Date	Base Value
BlueStar 5G Communications Index (Price Index)	BFIVG	Dec. 31, 2016	100
BlueStar 5G Communications Index Total Return	BFIVGTR	Dec. 31, 2016	100

2.2 Component Eligibility Requirements

All the following requirements must be met for a company's security to be included in BFIVG:

1. To be considered an 5G (5th Generation) Communications company, the company's business activity, products, or services meet the technical standards for, are used in the development of, or are otherwise instrumental in the rollout of 5G networks including: core carrier grade networking equipment including cellular antennas and routers, mobile network operators, satellite-based communications, enhanced mobile broadband chips, new radio technology, wireless network test and optimization equipment, cloud computing equipment, software defined networking or network functions virtualization, fiber optic cables, or cell tower and/or data center real estate investment trusts.
2. BlueStar screens a broad universe of US-listed publicly-traded common equity securities of global companies for those that might be considered 5G Communications companies. BlueStar researches company annual filings, investor and analyst presentations, sell-side research reports, industry reports and trade journals, and company descriptions on bona-fide sources such as public websites, FactSet and Bloomberg LP, to determine which companies are to be considered 5G Communications companies and included in the Global Universe of 5G Communications Companies.
3. Companies included in the Global universe of 5G Communications companies are then screened to meet investability and market capitalization criteria. All securities selected for inclusion must be listed for trade on a US stock exchange, have a maximum average bid-ask-spread of 1% and a minimum free-float percentage of 10%. Mobile network operators and real estate investment trusts must have a float-adjusted market capitalization of \$1 billion USD or greater, all other companies must have a float adjusted market capitalization of \$150 million USD or greater. In addition, all companies must have a six-month average daily value traded of \$250,000 or greater. For securities that do not have six months of average daily value traded data available, three months of data will be used and their eligibility for inclusion will be reviewed by the BlueStar Index Advisory Committee, which will consider factors such as liquidity over the time frame for which data is available, lock-up periods, and market capitalization.

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4. For existing components to be removed from the index, they must fail to meet the market cap or liquidity criteria included in 2.3.3, above, for two consecutive rebalance periods, or any other investability criteria only at the current rebalance period.
5. Companies that were previously removed from the index must meet market cap or liquidity criteria included in 2.3.3, above, above, for two consecutive rebalance periods in order to be eligible for re-entry into the index.

2.3 Initial Component Selection

The following steps are taken to assign weights to BFIVG components at each semi-annual rebalance period:

1. Establish the list of index components according to Chapter 2.2
2. Determine the First Initial Weight (IW') of each security in the list of index components where:

$$IW'_i = \frac{\text{Float Adjusted Market Cap in USD of Component } i}{\sum_{i=1}^N \text{Float Adjusted Market Cap in USD of Component } i}$$

Where:

IW'_i = IW' of component i

N = Number of components included in 2.3.1, above

3. Assign each security to a group labeled 1, 2, 3, or 4 as follows:
 - a. **Group 1** includes: **Core Equip.** (carrier grade routers, antennas, or other equipment/semiconductors used in RANs)
 - b. **Group 2** includes: **REITs** (cell tower and/or data center REITs); **MNO** (mobile network operators leading in the rollout of 5G in their respective markets); **Fiber** (fiber optic cables used in mobile networks and 5G cloud-core settings)
 - c. **Group 3** includes: **NFV** (network functions virtualization solutions for content distribution, network security, or quality of experience maximization); **Network Opt.** (mobile network test and optimization equipment)
 - d. **Group 4** Includes: **eMBB** (enhanced mobile broadband chips for end-user devices); **Cloud-Core** (cloud computing equipment serving as the core of 5G networks)
4. Find IW' First Modified Weight ($IW'MW'$) of each security by finding each component's weight within its respective Group where:

$$IW'MW'_i = \frac{IW_i}{\sum_{i=1}^{N_G} IW'_{iG}} * TW_G$$

Where:

N_G = Number of components included in a given group described in 2.3.2, above

TW_G = Target Weight of a given group where:

TW_G for Group 1 = 40%

TW_G for Group 2 = 30%

TW_G for Group 3 = 15%

TW_G for Group 4 = 15%

5. Find Second Modified Weight ($IW'MW''$) of each component such that the weight of any component with an $IW'MW'$ less than 0.50% is set to equal 0.50%, the aggregate weight increase for each Group 1-4 is deducted from the remaining components of each Group on a pro-rata basis.
6. Repeat step 5, above, until no component's weight is less than 0.50%

7. Set maximum security weight ($MAXW_i$) for each component based on the minimum of a or b, below:
 - a. Absolute limit where:
 - i. Absolute limit for components of group 1 is 5%
 - ii. Absolute limit for components of groups 2 and 3 is 3%
 - iii. Absolute limit for components of group 4 is 1%
 - b. Liquidity-based limit where:
 - i. Liquidity-based limit = the component's six-month average daily value in USD traded divided by 200 million USD
8. Find IW' Third Modified Weight ($IW'MW'''$) of each component where if the $IW'MW'''_i$ is greater than the $MAXW_i$, the $IW'MW'''$ for that component is set to $MAXW_i$.
9. Find IW' Fourth Modified Weight ($IW'MW''''$) where:
 - a. For any component's whose weight was adjusted in step 7, above, $IW'MW''''$ equals $IW'MW'''$
 - b. For components whose weight was not adjusted in step 7, above, $IW'MW''''$ is equal to $IW'MW'''$ plus its prorata share of the aggregate weight reduction for its respective Group as a result of step 7, above.
10. Find the Final Weight (FW) of each security by repeating steps 7 and 8, above until all the following constraints are satisfied:
 - a. The aggregate weight of all securities is equal to 100%
 - b. The aggregate weight of companies in each group (1-4) is equal to the respective Target Group Weights
 - c. The maximum weight of any security in groups 1 is less than or equal to 5%
 - d. The maximum weight of any security in groups 2 or 3 is less than or equal to 3%
 - e. The maximum weight of any security in group 4 is less than or equal to 1%
 - f. The USD value of any security based on its FW in a \$200 million USD portfolio does not exceed its six-month average daily value traded.

2.4 Dividend Treatment The price index does not take normal dividend payments into account.

Dividends are accounted for by reinvesting them daily. BFIVG uses the ex-dividend date to determine the total daily dividends for each day. Special dividends require an index divisor adjustment, as described in Chapter 3, to prevent such distributions from distorting the price index.

2.5 Index Equations

1. The price index is calculated using the following basic equations:

$$I_{(t)} = \frac{\sum_{i=1}^n P_{i(t)} * S_{i(t)}}{D_{(t)}}$$

Where:

$I_{(t)}$ = Index value at time (t)
 $D_{(t)}$ = Divisor at time (t)
 n = Number of stocks in the index
 t = The time that the index is calculated
 $P_{i(t)}$ = Price of stock i at time t in USD terms
 $S_{i(t)}$ = Number of assigned shares of stock i at time t

Where:

$$D_{(t)} = \frac{\sum_{i=1}^n P_{i(t-1)} * S_{i(t-1)}}{I_{(t-1)}}$$

Where:

$I_{(t-1)}$ = Index value at time $t-1$
 $D_{(t)}$ = Divisor at time t
 n = Number of stocks in the index
 $P_{i(t-1)}$ = Closing price of stock i at time $t-1$ in USD terms
 $S_{i(t-1)}$ = Number of assigned shares of stock i at time $t-1$

Where:

$$D_{(0)} = \frac{\sum_{i=1}^n P_{i(0)} * S_{i(0)}}{I_{(0)}}$$

Where:

$I_{(0)}$ = Index value at time 0 100
 $D_{(0)}$ = Divisor at time 0
 n = Number of stocks in the index
 $P_{i(0)}$ = Closing price of stock i at time 0 in USD terms
 $S_{i(0)}$ = Number of assigned shares of stock i at time 0

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2. Assigned shares are the number of shares needed for each component such that the component conforms to the weighting distribution outlined in Chapter 2.3.5
3. Changes to the index composition require divisor adjustments to retain index continuity before and after specific events, as outlined in Chapter 3. Divisor changes are made according to the following equation:

$$D_{(t+1)} = D_{(t)} * \frac{\sum_{i=1}^n P_{i(t+1)} * S_{i(t+1)}}{\sum_{i=1}^n P_{i(t)} * S_{i(t)}}$$

Where:

$D_{(t+1)}$ = Initial Divisor after changes are made to the index

Chapter 3: Index Maintenance

This chapter describes the circumstances that require index changes, as well as the details on performing those changes

3.1 Divisor Changes

Changes to the index composition due to corporate actions or component eligibility changes will require adjustments to the index divisor, as follows:

*Spinoff**

1. Subtract the following from the price of the parent company:

$$\frac{\text{Spinoff stock price}}{\text{Share exchange ratio}}$$

2. Adjust the component's assigned shares such that its weighting is not changed because of the spinoff

Special Cash Dividend

1. Subtract special dividend from share price

Rights Offering

1. Subtract the following from the price of the parent company:

$$\frac{\text{Price of rights}}{\text{Rights ratio}}$$

2. Adjust the component's assigned shares such that its weighting is not changed because of the rights offering

Divisor changes are usually made on the date the corporate action becomes effective. For example, BFIVG uses the ex-dividend date rather than the payment date to determine when making divisor adjustments.

*If a company being spun-off is only trading on a "when-issued" basis, the "when-issued" price will be used to adjust the parent company's closing price.

3.2 Details of Share Changes

Stock splits and reverse splits do not require index divisor adjustments because the corresponding change to the stock price equally offsets the number of assigned shares, therefore not affecting the component's influence in the index.

3.3 Scheduled Component Changes and Review

BFIVG has a semi-annual review in June and December of each year. Fundamental data, prices and trading volumes are captured on the Selection Date which is the first Thursday of June and December. The new number of assigned shares for each component is determined based on the component's weight as determined in 2.3 and the closing price of that component on the Selection Date. Component changes are announced and made available after the close on the second Thursday of June and December. Component changes are implemented after the close on the third Thursday of June and December and are effective at the opening on the third Friday of June and December.

3.4 Interim Component Changes

1. Component changes may occur between regularly-scheduled review periods if a specific corporate event makes an existing component ineligible. The following events may require a component's removal or replacement:

Merger or Acquisition

If a merger or acquisition results in one component absorbing another, the resulting company will remain a component and the absorbed company will be removed or replaced. If a non-component company absorbs a component company, the original component will be removed, unless the non-component company, after absorbing the assets of the component company, would be considered a Global 5G Communications company as described in Chapter 2.2. If a component is the target of an acquisition BlueStar may decide to remove or reduce the weight of that component after the "go-shop" period concludes to reduce potential volatility or liquidity risk in the index.

Spin-Off

The spun-off company will be added to the index according to the transaction terms of the effective date. Furthermore, the spun-off company will remain in the index until the next ordinary rebalance date. The parent company will remain in the index provided it fulfills all the selection criteria.

Bankruptcy

A component company will be removed and replaced immediately after bankruptcy filing. Exceptions are made on a case-by-case basis. For example, a security may not be removed immediately if bankruptcy filing is not the result of operating or financial difficulties.

Delisting

A component company will be removed or replaced immediately after being delisted from its primary market.

Whenever possible, interim component changes are announced on BlueStar's publicly-available website at least three trading days prior to component changes becoming effective.

Chapter 4: Index Calculation and Dissemination

This chapter summarizes calculation and dissemination practices, quality assurance practices, and the circumstances requiring calculation corrections.

4.1 Price Calculation

Price and total return indexes for BFIVG are calculated by Solactive AG on both an end-of-day and real-time basis. The BFIVG is calculated using the last traded price for each company in the Index from the relevant exchanges and markets.

Index values are rounded to two decimal places and divisors are rounded to 14 decimal places.

4.2 Calculation Frequency and Dissemination

BFIVG is calculated on a real-time basis beginning when the first traded price of any of the Index components is received by Solactive AG. Prices are delivered to Boerse Stuttgart AG every 15 seconds and subsequently published at that frequency. Total return index values are available on a real-time basis through the Bloomberg information system under the index symbol “BFIVGTR INDEX”. End-of-day total return index values are posted on BlueStar’s and Solactive AG’s publicly available websites, www.bluestarindexes.com and www.Solactive.com, respectively.

If the exchange a stock is listed on is closed or if trading in a stock is suspended prior to the market opening, the stock’s adjusted closing price from the previous day will be used in the Index calculation until trading commences. If trading in a stock is suspended while the relevant market is open, the last traded price for that stock will be used for all subsequent Index calculations until trading resumes.

4.3 Input Data

Solactive AG uses various quality assurance tools to audit, monitor, and maintain the accuracy of its input data. While every reasonable effort is taken to ensure high standards of data integrity, there is no guarantee against errors. Please refer to the Data Correction section for more detail.

The index closing price is calculated using the closing prices issued by the primary exchange for each component stock in the index. If the primary exchange changes the closing price of a component stock, the new price will be used to calculate the index closing price.

4.4 Data Corrections

Incorrect index component data, corporate action data, or Index Divisors will be corrected upon detection or as soon and feasible.

Incorrect intraday index tick data will not be corrected. However, incorrect opening and closing values will be corrected as soon as possible after detection.

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Appendices

This section provides additional information related to BFIVG as well as changes to this document.

Appendix A. BlueStar 5G Communications Index Constituents

As of December 11, 2018, Selection Date

Company Name	Ticker	Exchange	Weight
XILINX INC	XLNX	NASDAQ.GS	5.00%
SKYWORKS SOLUTIONS INC	SWKS	NASDAQ.GS	5.00%
NOKIA CORP-SPON ADR	NOK	New York	5.00%
FINISAR CORPORATION	FNSR	NASDAQ.GS	5.00%
ERICSSON (LM) TEL-SP ADR	ERIC	NASDAQ.GS	5.00%
COMMSCOPE HOLDING CO INC	COMM	NASDAQ.GS	5.00%
INTELSAT SA	I	New York	3.70%
UBIQITI NETWORKS INC	UBNT	NASDAQ.GS	3.13%
VERIZON COMMUNICATIONS INC	VZ	New York	3.00%
CISCO SYSTEMS INC	CSCO	NASDAQ.GS	3.00%
BROADCOM INC	AVGO	NASDAQ.GS	3.00%
AT&T INC	T	New York	3.00%
KEYSIGHT TECHNOLOGIES IN	KEYS	New York	2.46%
MAXAR TECHNOLOGIES INC	MAXR	New York	2.40%
MACOM TECHNOLOGY SOLUTIONS H	MTSI	NASDAQ.GS	2.40%
INFINERA CORP	INFN	NASDAQ.GS	2.40%
CASA SYSTEMS INC	CASA	NASDAQ.GS	2.40%
AKAMAI TECHNOLOGIES INC	AKAM	NASDAQ.GS	2.23%
F5 NETWORKS INC	FFIV	NASDAQ.GS	2.16%
QUALCOMM INC	QCOM	NASDAQ.GS	2.16%
AMERICAN TOWER CORP	AMT	New York	2.14%
JUNIPER NETWORKS INC	JNPR	New York	2.02%
AMDOCS LTD	DOX	NASDAQ.GS	1.79%
VMWARE INC-CLASS A	VMW	New York	1.75%
COMTECH TELECOMMUNICATIONS	CMTL	NASDAQ.GS	1.70%
VODAFONE GROUP PLC-SP ADR	VOD	NASDAQ.GS	1.57%
CHINA MOBILE LTD-SPON ADR	CHL	New York	1.54%
ADTRAN INC	ADTN	NASDAQ.GS	1.47%
CROWN CASTLE INTL CORP	CCI	New York	1.39%
CIENA CORP	CIEN	New York	1.13%
ORANGE-SPON ADR	ORAN	New York	0.96%
EQUINIX INC	EQIX	NASDAQ.GS	0.91%
BT GROUP PLC-SPON ADR	BT	New York	0.79%
CORNING INC	GLW	New York	0.78%
DIGITAL REALTY TRUST INC	DLR	New York	0.72%
SPRINT CORP	S	New York	0.70%
SK TELECOM CO LTD-SPON ADR	SKM	New York	0.70%
SBA COMMUNICATIONS CORP	SBAC	NASDAQ.GS	0.70%
MELLANOX TECHNOLOGIES LTD	MLNX	NASDAQ.GS	0.70%
HEWLETT PACKARD ENTERPRISE	HPE	New York	0.70%
CENTURYLINK INC	CTL	New York	0.70%
VIAVI SOLUTIONS INC	VIAV	NASDAQ.GS	0.51%
RIBBON COMMUNICATIONS INC	RBBN	NASDAQ.GS	0.51%
RADWARE LTD	RDWR	NASDAQ.GS	0.51%
NETSCOUT SYSTEMS INC	NTCT	NASDAQ.GS	0.51%
EXTREME NETWORKS INC	EXTR	NASDAQ.GS	0.51%
A10 NETWORKS INC	ATEN	New York	0.51%
SIERRA WIRELESS INC	SWIR	NASDAQ.GS	0.51%
NEOPHOTONICS CORP	NPTN	New York	0.51%
NATIONAL INSTRUMENTS CORP	NATI	NASDAQ.GS	0.51%
LUMENTUM HOLDINGS INC	LITE	NASDAQ.GS	0.51%
LATTICE SEMICONDUCTOR CORP	LSCC	NASDAQ.GS	0.51%
IPG PHOTONICS CORP	IPGP	NASDAQ.GS	0.51%
INTERDIGITAL INC	IDCC	NASDAQ.GS	0.51%
ACACIA COMMUNICATIONS INC	ACIA	NASDAQ.GS	0.51%
CERAGON NETWORKS LTD	CRNT	NASDAQ.GS	0.40%
ALLOT LTD	ALLT	NASDAQ.GS	0.14%

Appendix B. Document Change History

A history of significant changes to this document is shown in the table below

Issue	Date	Change
1.0	February 19, 2019	Initial publication
1.1	December 1, 2019	<ol style="list-style-type: none"> 1. Add investability criteria: 10% minimum free-float percentage & maximum bid-ask spread of 1% 2. Change to rebalance schedule 3. Add 2-step removal and re-entry procedure 4. Changes to sub-theme groupings, group target weights, and group absolute weight limits 5. Change liquidity overlay threshold from \$100 million to \$200 million