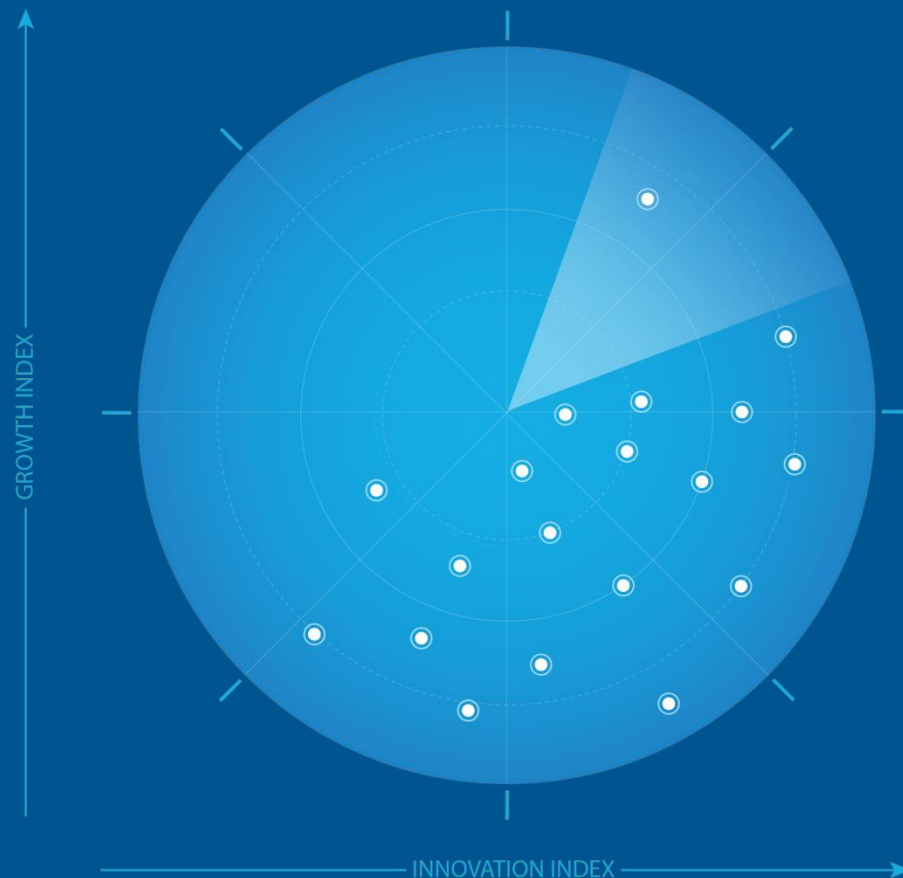


# Frost Radar™: 5G Network Infrastructure, 2022

A Benchmarking System  
to Spark Companies to  
Action—Innovation that  
Fuels New Deal Flow and  
Growth Pipelines

Global Information &  
Communications Technologies  
Research Team at Frost & Sullivan



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# Strategic Imperative and Growth Environment



# Strategic Imperative

- This Frost Radar™ covers the year 2021.
- Frost & Sullivan defines 5G network infrastructure to include the following:
  - Radio Access Networks (RAN)
  - Transport networks
  - Core networks, which may include one or more edge networks
- 5G introduces many disruptive technologies, from new chips and devices to new network architectures, that will impact all areas of network infrastructure.
- The promise of 5G for consumers and for enterprises is huge. The impact to communications service providers (CSPs) and their suppliers is equally large (in a good way). Growth opportunities abound.
- The 5G core and edge networks are now entirely cloud-based, and the 5G RAN is quickly moving to the cloud. In addition, the industry is exploring open interfaces and new architectures for the 5G RAN (which Frost & Sullivan refers to as open and virtual RAN), enabling new suppliers to compete in the market. The 5G transport networks tie together the RAN, the edge, and the core and also is cloud-based.
- Functions from the core network and from the RAN are moving to edge networks to reduce latency and enable new use cases.

Source: Frost & Sullivan

# Strategic Imperative (continued)

- While CSPs are heavily investing in 5G, how financially successful the 5G era is for them remains to be seen. This will depend largely on how they monetize the technology and how successful they are with the enterprise segment, which has the potential to grow significantly.
- Device and infrastructure suppliers are succeeding now with CSP investments, but new business models need to be created for the providers themselves to cash in.
- The consumer market, which has been the bread and butter for CSPs, will remain very important, but profit margins will remain low.
- The business and enterprise market will become key to the success of CSPs. Network slicing and private wireless networks will be areas of focus. Slicing will become more widespread as 5G networks become stand-alone, utilizing a 5G core network. This is slowly happening worldwide.
- The chaos caused by the COVID-19 pandemic has affected 5G, but surprisingly the impact has been relatively muted. The 5G rollout continues with relatively minimal impact (and is continuing to roll out faster than 4G did more than a decade ago.).
- A greater impact to 5G has come from the United States pushing to block Chinese suppliers from competing in parts of the world. This primarily affects Huawei and ZTE, 2 leading network infrastructure providers. Some suppliers have looked to take advantage of the situation, with Samsung increasing market share in certain geographies and now NEC also looking to expand outside of Japan.

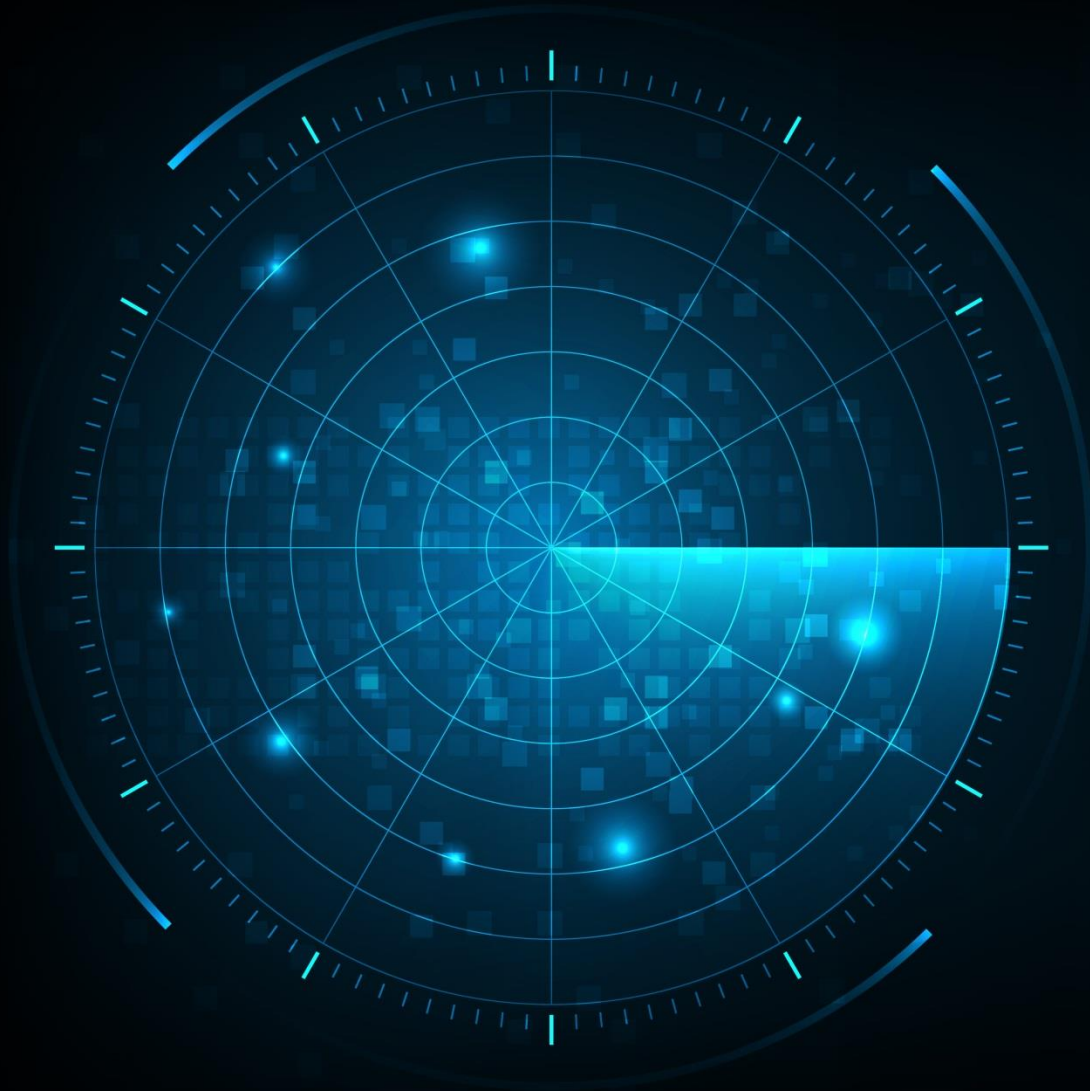
Source: Frost & Sullivan



# Growth Environment

- Frost & Sullivan believes that global CSPs altogether invested nearly \$60 billion in 2021 on their mobile and wireless network infrastructure, depending on what is included. This investment is growing at a compound annual growth rate (CAGR) of approximately 7% through 2026. The majority of that spend is on the RAN, with smaller spend on the transport and core networks.
- While the 5G era is underway, investments in 2G, 3G, and 4G networks continue. 4G networks remain in the majority and will for the next few years; this means investment in 4G is still considerable. However, investment in 4G networks is already flattening and will soon begin to decline. Investment in 5G networks will accelerate and become dominant. Limited investment in 2G and 3G networks continues but is declining.
- Frost & Sullivan studies related to this independent analysis:
  - [Global 5G Network Infrastructure Growth Opportunities](#), January 2022
  - [Global Open and Virtual 5G Radio Access Network Growth Opportunities](#), October 2021
  - [Global Private 5G Network Growth Opportunities](#), August 2021
  - [5G Use Cases Employ Disruptive Technologies to Define the Global 5G Network Infrastructure Market](#), May 2021

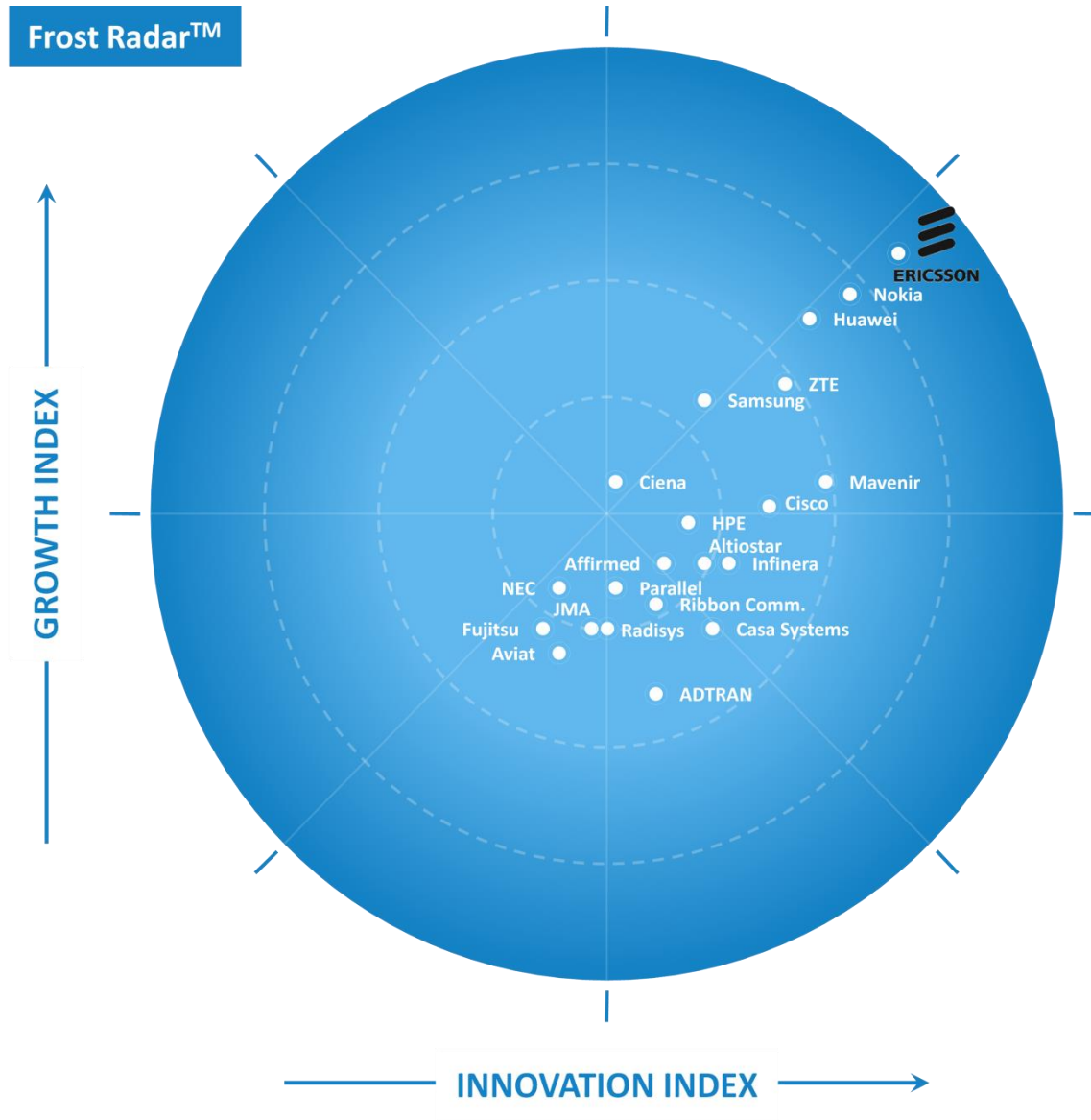
Source: Frost & Sullivan



**Frost Radar™**

**5G Network  
Infrastructure**

# Frost Radar™: 5G Network Infrastructure



Source: Frost & Sullivan

# Frost Radar™: Competitive Environment

- In a field of more than 100 global industry participants, Frost & Sullivan independently plotted the top 21 companies in this Frost Radar™ analysis. These companies either lead the market overall, lead a market segment, or are thought leaders in certain segments.
- The 5G network infrastructure market is emerging and built upon the established 4G network infrastructure market; therefore, it is unsurprising that leaders from 4G place highly here.
- The architecture of 5G brings the possibility of many suppliers working together in each of the areas of network infrastructure: RAN, core/edge networks, and transport networks. In other words, the core network is likely not from a single supplier, but from many suppliers each providing one or more network functions. This opens the market to new suppliers. Increased competitive intensity raises the level of innovation.
- The Frost Radar™ measures growth rates in addition to absolute revenue and combines them with several other factors ([described here](#)) to measure companies' performance along the Growth axis. The Frost Radar™ measures innovation for each company by assessing its product portfolio, examining the scalability of its innovations, looking at the efficacy of its R&D strategy, and considering several other factors ([described here](#)).
- In this analysis, Ericsson ranked highest on the Frost Radar™, followed by Nokia and Huawei. All were leaders in 4G network infrastructure and continue to lead the 5G network infrastructure market. Their offerings include RAN, transport networks, and core/edge networks.

Source: Frost & Sullivan



# **Companies to Action**

**Companies to Be Considered First for  
Investment, Partnerships, or Benchmarking**

# Ericsson

## INNOVATION

- Ericsson has proven its ability to scale its innovations globally with 2G, 3G, 4G, and now 5G. For 5G, the company currently reports 108 live 5G networks in 48 countries (the highest level that Frost & Sullivan has seen publicly reported).
- The company invests significant amounts in R&D; this is essential in a market where technology is always evolving.
- Ericsson's product portfolio includes all areas of 5G network infrastructure as well as previous generations of network infrastructure. Ericsson also offers private networks and is an active participant in the O-RAN Alliance.
- The CSP market is Ericsson's primary focus; the company's strategy continues to center on evolving CSP needs in all areas of the world.

## GROWTH

- As a leader in the 4G infrastructure market, Ericsson enters the 5G market with a large customer base.
- The company has done an excellent job keeping its current customers and adding new customers: it reports 170 commercial 5G agreements and 88 publicly announced 5G contracts. Ericsson maintains a significant pipeline of customers that have yet to move to 5G but will over the coming years.
- Ericsson has spent the last few years adjusting its overall strategy to focus on profitability. The company has indicated that its strategy has been successful, even with the challenges brought by the pandemic.

## FROST PERSPECTIVE

- The 5G era is just beginning but will be long-lived. While the company's turnaround strategy has been declared successful, the battle to continue to grow and maintain profitability is just starting and will need a sustained focus. Outside of China, the company's 5G journey has been impressive.
- Participating in the nascent open and virtual RAN movement is essential. While significant sales may be years away, eventually open and virtual RAN will become the norm.
- The market for private 4G and 5G networks is growing rapidly, and that growth should continue for many years. Ericsson must work with its CSP customers to target these new opportunities in the enterprise world.

Source: Frost & Sullivan

## Strategic Insights



# Strategic Insights

1

Growth opportunities abound in the 5G market, from network infrastructure suppliers to their CSP clients and, in some cases, their enterprise clients, and from CSPs to their consumer and enterprise customers. Growth in the 5G network infrastructure market is just getting underway and will present opportunities for the next decade or more. This is a large market: in the many tens of billions of dollars annually.

2

The architecture of 5G has moved much of the 5G network infrastructure to be software driven in a cloud environment. This has opened the market to many new suppliers. Companies that were once called “network equipment providers” still lead the market, but they face much more competition as the market moves from hardware (equipment) to software (network functions).

3

Open and virtual RAN covering 5G and previous generations is a niche market now but will grow significantly over the next decade. Private 4G and 5G networks also are a small submarket at this point but will experience strong growth in the coming years. Both areas should be considered for all 5G network infrastructure suppliers. Both new niches also give smaller suppliers new inroads into the market.

Source: Frost & Sullivan





## Next Steps: Leveraging the Frost Radar™ to Empower Key Stakeholders



# Significance of Being on the Frost Radar™

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Companies plotted on the Frost Radar™ are the leaders in the industry for growth, innovation, or both. They are instrumental in advancing the industry into the future.

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## GROWTH POTENTIAL

Your organization has significant future growth potential, which makes it a Company to Action.

## BEST PRACTICES

Your organization is well positioned to shape Growth Pipeline™ best practices in your industry.

## COMPETITIVE INTENSITY

Your organization is one of the key drivers of competitive intensity in the growth environment.

## CUSTOMER VALUE

Your organization has demonstrated the ability to significantly enhance its customer value proposition.

## PARTNER POTENTIAL

Your organization is top of mind for customers, investors, value chain partners, and future talent as a significant value provider.

Source: Frost & Sullivan

# Frost Radar™ Empowers the CEO's Growth Team

## STRATEGIC IMPERATIVE

- Growth is increasingly difficult to achieve.
- Competitive intensity is high.
- More collaboration, teamwork, and focus are needed.
- The growth environment is complex.

## LEVERAGING THE FROST RADAR™

- The Growth Team has the tools needed to foster a collaborative environment among the entire management team to drive best practices.
- The Growth Team has a measurement platform to assess future growth potential.
- The Growth Team has the ability to support the CEO with a powerful Growth Pipeline™.

## NEXT STEPS

- **Growth Pipeline Audit™**
- **Growth Pipeline as a Service™**
- **Growth Pipeline™ Dialogue with Team Frost**

Source: Frost & Sullivan

# Frost Radar™ Empowers Investors

## STRATEGIC IMPERATIVE

- Deal flow is low and competition is high.
- Due diligence is hampered by industry complexity.
- Portfolio management is not effective.

## LEVERAGING THE FROST RADAR™

- Investors can focus on future growth potential by creating a powerful pipeline of Companies to Action for high-potential investments.
- Investors can perform due diligence that improves accuracy and accelerates the deal process.
- Investors can realize the maximum internal rate of return and ensure long-term success for shareholders.
- Investors can continually benchmark performance with best practices for optimal portfolio management.

## NEXT STEPS

- **Growth Pipeline™ Dialogue**
- **Opportunity Universe Workshop**
- **Growth Pipeline Audit™ as Mandated Due Diligence**

Source: Frost & Sullivan

# Frost Radar™ Empowers Customers

## STRATEGIC IMPERATIVE

- Solutions are increasingly complex and have long-term implications.
- Vendor solutions can be confusing.
- Vendor volatility adds to the uncertainty.

## LEVERAGING THE FROST RADAR™

- Customers have an analytical framework to benchmark potential vendors and identify partners that will provide powerful, long-term solutions.
- Customers can evaluate the most innovative solutions and understand how different solutions would meet their needs.
- Customers gain a long-term perspective on vendor partnerships.

## NEXT STEPS

- **Growth Pipeline™ Dialogue**
- **Growth Pipeline™ Diagnostic**
- **Frost Radar™ Benchmarking System**

Source: Frost & Sullivan

# Frost Radar™ Empowers the Board of Directors

## STRATEGIC IMPERATIVE

- Growth is increasingly difficult; CEOs require guidance.
- The Growth Environment requires complex navigational skills.
- The customer value chain is changing.

## LEVERAGING THE FROST RADAR™

- The Board of Directors has a unique measurement system to ensure oversight of the company's long-term success.
- The Board of Directors has a discussion platform that centers on the driving issues, benchmarks, and best practices that will protect shareholder investment.
- The Board of Directors can ensure skillful mentoring, support, and governance of the CEO to maximize future growth potential.

## NEXT STEPS

- **Growth Pipeline Audit™**
- **Growth Pipeline as a Service™**

Source: Frost & Sullivan



# Frost Radar™ Analytics



# Frost Radar™: Benchmarking Future Growth Potential

2 Major Indices, 10 Analytical Ingredients, 1 Platform

## VERTICAL AXIS

**Growth Index (GI)** is a measure of a company's growth performance and track record, along with its ability to develop and execute a fully aligned growth strategy and vision; a robust growth pipeline™ system; and effective market, competitor, and end-user focused sales and marketing strategies.

## GROWTH INDEX ELEMENTS

- **GI1: MARKET SHARE (PREVIOUS 3 YEARS)**  
This is a comparison of a company's market share relative to its competitors in a given market space for the previous 3 years.
- **GI2: REVENUE GROWTH (PREVIOUS 3 YEARS)**  
This is a look at a company's revenue growth rate for the previous 3 years in the market/industry/category that forms the context for the given Frost Radar™.
- **GI3: GROWTH PIPELINE™**  
This is an evaluation of the strength and leverage of a company's growth pipeline™ system to continuously capture, analyze, and prioritize its universe of growth opportunities.
- **GI4: VISION AND STRATEGY**  
This is an assessment of how well a company's growth strategy is aligned with its vision. Are the investments that a company is making in new products and markets consistent with the stated vision?
- **GI5: SALES AND MARKETING**  
This is a measure of the effectiveness of a company's sales and marketing efforts in helping it drive demand and achieve its growth objectives.

# Frost Radar™: Benchmarking Future Growth Potential

2 Major Indices, 10 Analytical Ingredients, 1 Platform

## HORIZONTAL AXIS

**Innovation Index (II)** is a measure of a company's ability to develop products/services/solutions (with a clear understanding of disruptive Mega Trends) that are globally applicable, are able to evolve and expand to serve multiple markets, and are aligned to customers' changing needs.

## INNOVATION INDEX ELEMENTS

- **II1: INNOVATION SCALABILITY**

This determines whether an organization's innovations are globally scalable and applicable in both developing and mature markets, and also in adjacent and non-adjacent industry verticals.

- **II2: RESEARCH AND DEVELOPMENT**

This is a measure of the efficacy of a company's R&D strategy, as determined by the size of its R&D investment and how it feeds the innovation pipeline.

- **II3: PRODUCT PORTFOLIO**

This is a measure of a company's product portfolio, focusing on the relative contribution of new products to its annual revenue.

- **II4: MEGA TRENDS LEVERAGE**

This is an assessment of a company's proactive leverage of evolving, long-term opportunities and new business models, as the foundation of its innovation pipeline. An explanation of Mega Trends can be found [here](#).

- **II5: CUSTOMER ALIGNMENT**

This evaluates the applicability of a company's products/services/solutions to current and potential customers, as well as how its innovation strategy is influenced by evolving customer needs.

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