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INTELLIGENT AUTOMATION

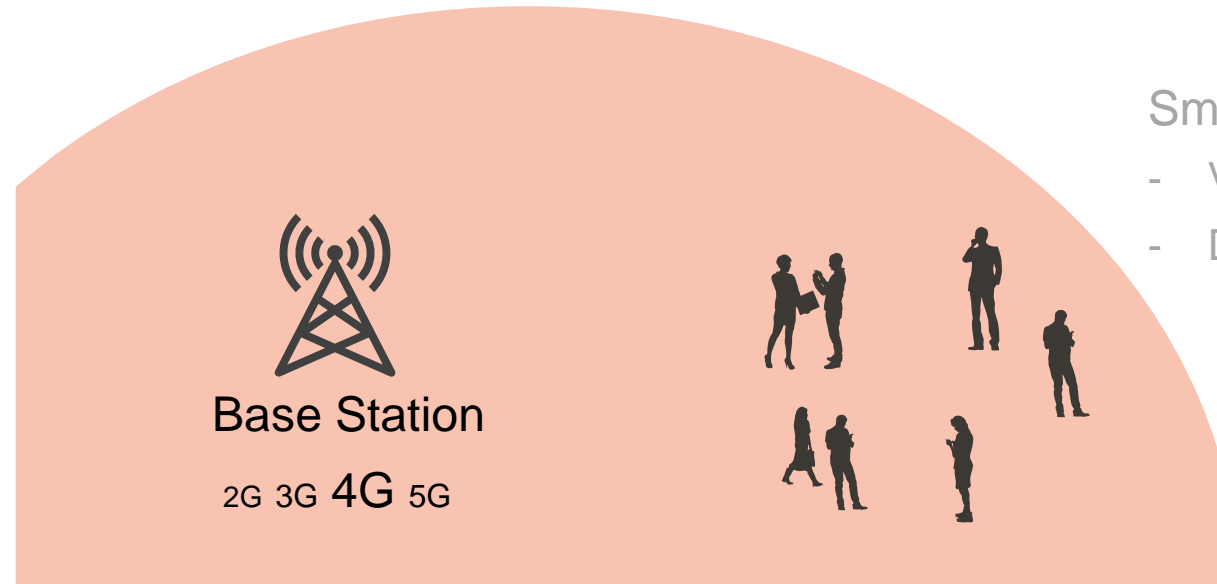
Dynamic Administration for Future of
Networks

TELECOM NETWORK TODAY

OPERATOR

5G deployments
2G or 3G decommissioning
ORAN trials

NETWORK



USAGE

Smart phones

- Voice
- Data
 - VOIP
 - Content
 - Social media
 - Web
 - Video & photos
 - App data

Other Devices

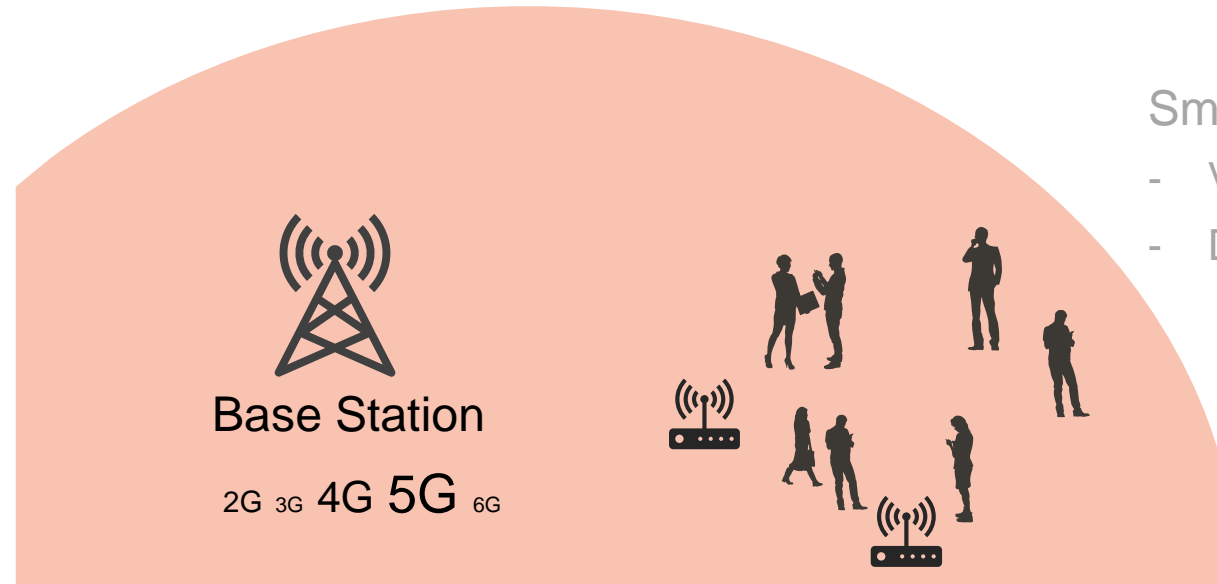
TELECOM NETWORK TOMORROW

OPERATOR

NETWORK

USAGE

5G dominates network
ORAN deployments



Smart phones

- Voice
- Data
 - VOIP
 - Content
 - Social media
 - Web
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 - App data

Other services

WIFI Service

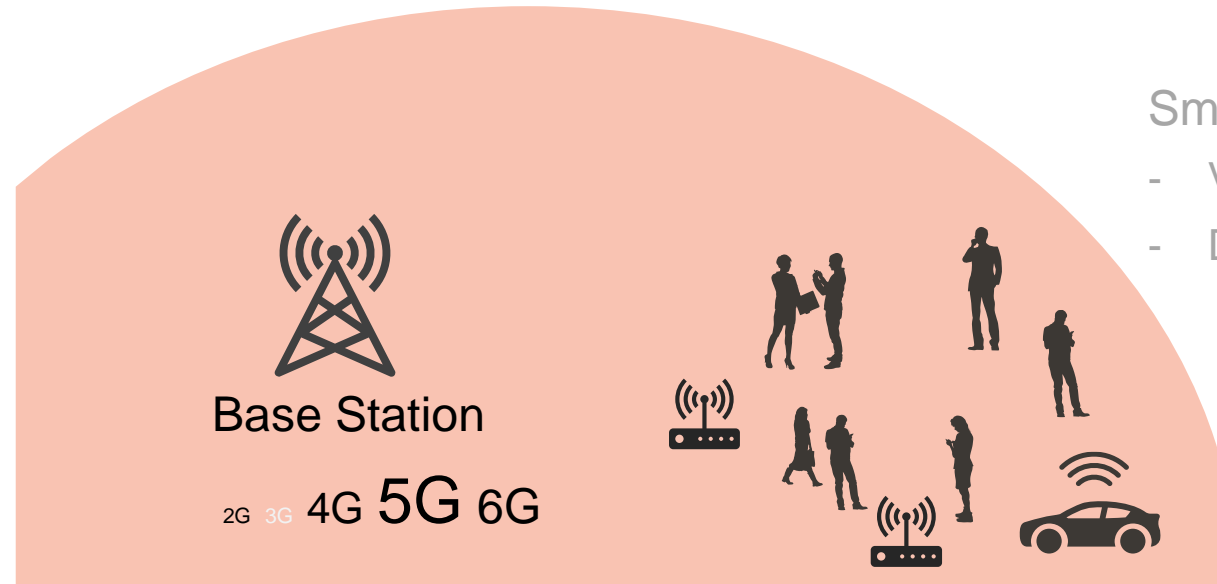
TELECOM NETWORK FUTURE

OPERATOR

NETWORK

USAGE

ORAN deployments
6G trials



Smart phones

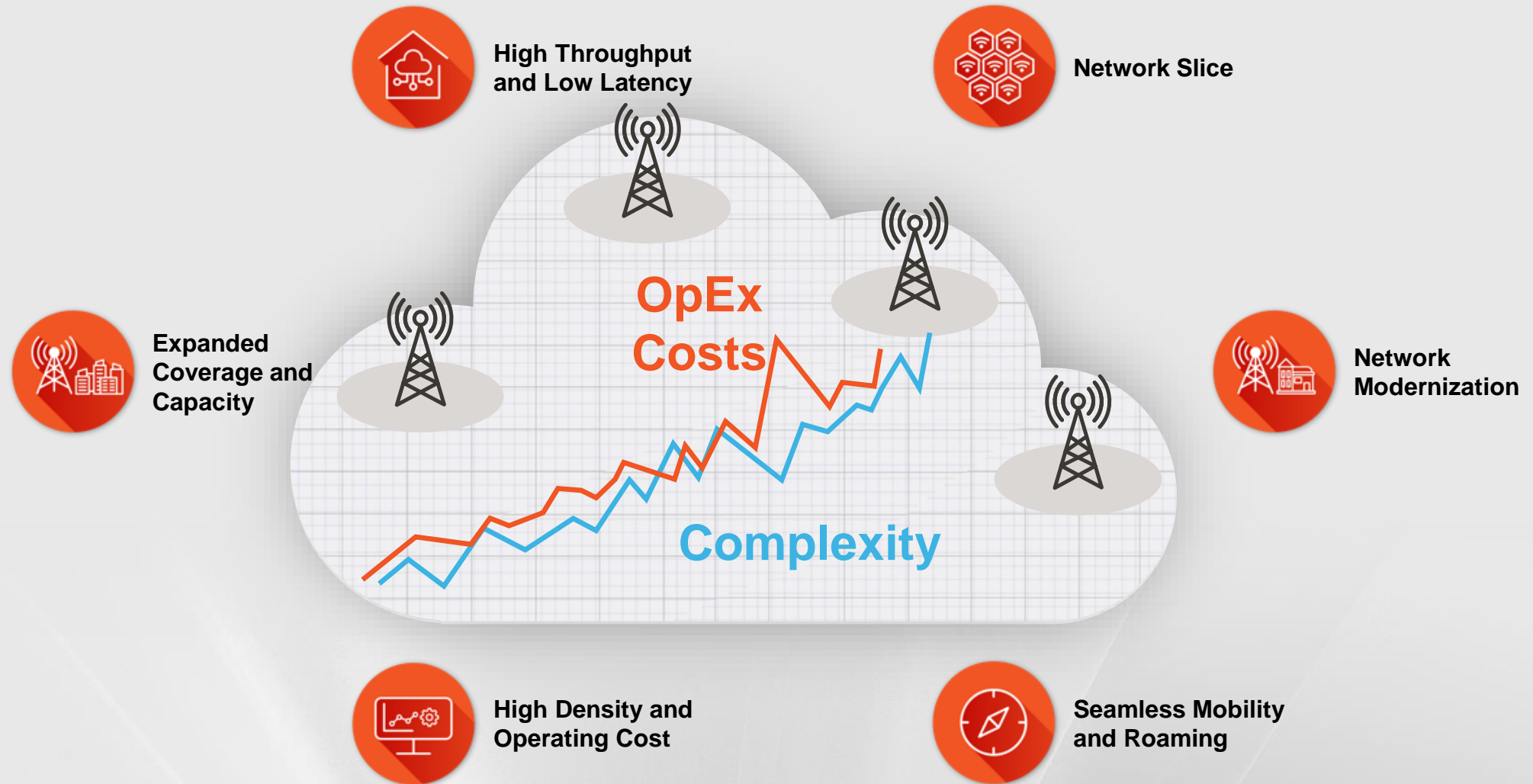
- Voice
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WIFI Service

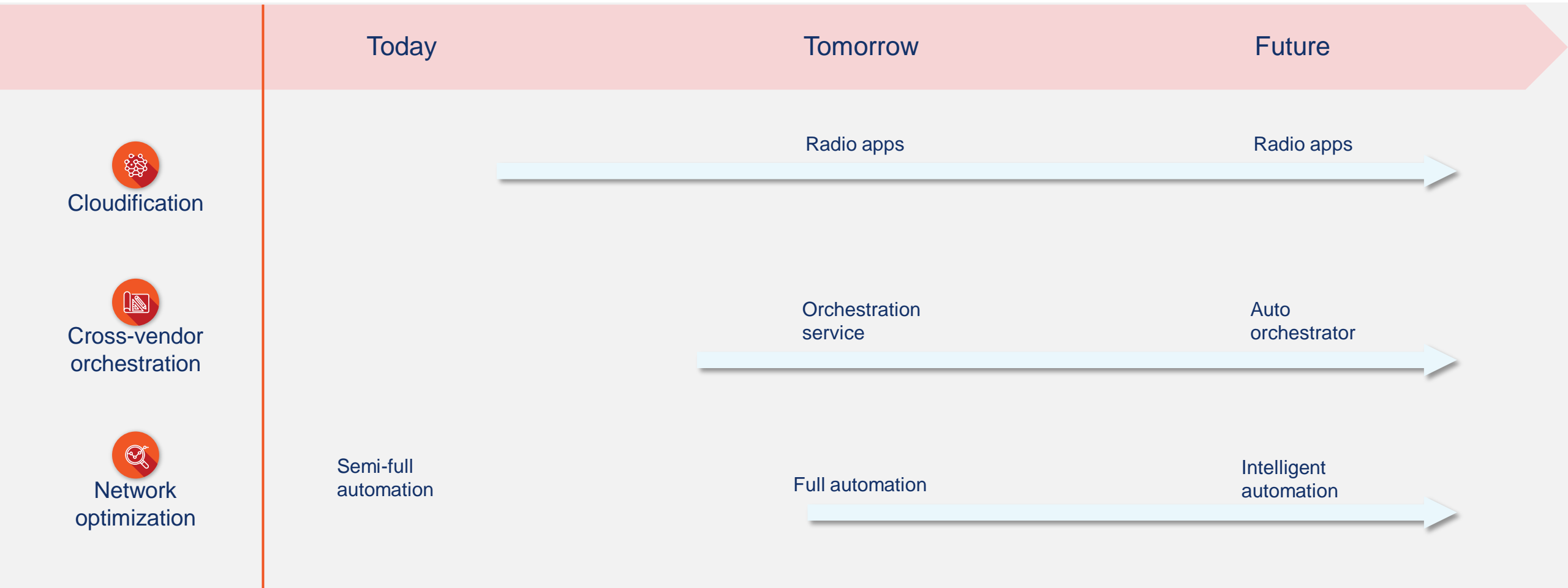
IoT devices

Connected Cars

INCREASING NETWORK COMPLEXITY AND COSTS



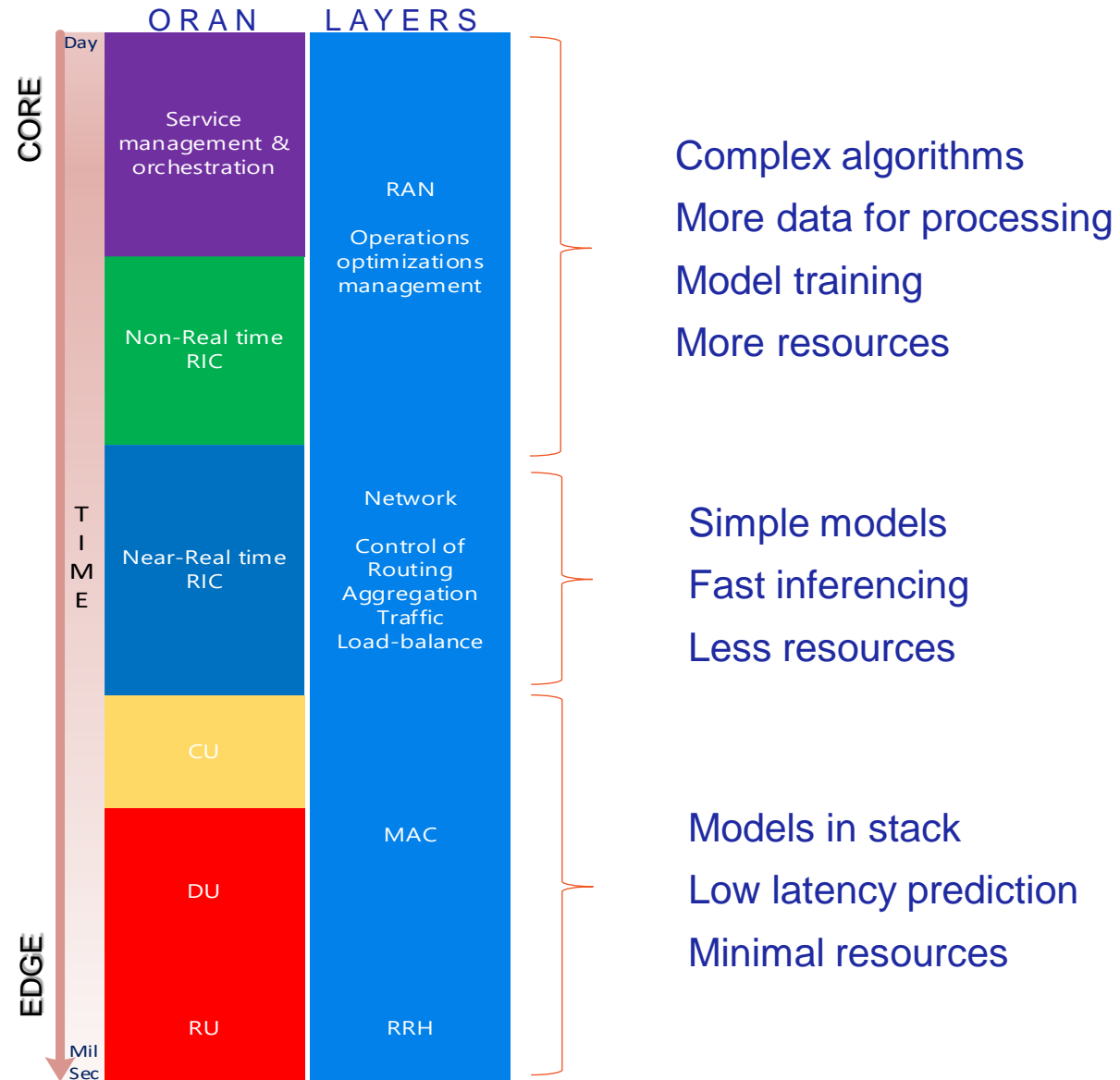
ORAN DEPLOYMENTS DRIVE MASSIVE CHANGE



INTELLIGENT APPS IN TELECOM STACK

Predict . Forecast . Classify

- Latency bound
- Resource driven



INTELLIGENT AUTOMATION

Machine Learning driving automation in close loops called ***Intelligent Automation***, has potential to run future of networks at peak.

FROM RESEARCH TO OPERATION



Intelligent Automation Apps

Deep learning enabled, view into immediate future, intelligent course-correction with automation
Avoids faults or disasters from happening, keeps network run at peak, mimics human



Delivery and Operationalization

ML Apps packaged, delivered over ML Ops
App deployment and life-cycle management



Research and Development

Rapid research, development & packaging
Process automation

AUTOMATED MANAGEMENT CONTROLS

Day 1+: Operation – optimization

Auto administration

- Monitor performance & prevent degradation
- Identify anomalies, detect potential failure, avoidance
- Optimize demand and capacity
- Reduce operating cost, energy, compute
- Enhance security

Day 1+: Optimization – fine tuning

Auto configuration

- Improve capacity, coverage, throughput
- Enhance radio performance micro-controls
- Improve quality of service

Day 0+: Initial Configuration

Basic set up

- Provision & configure base station

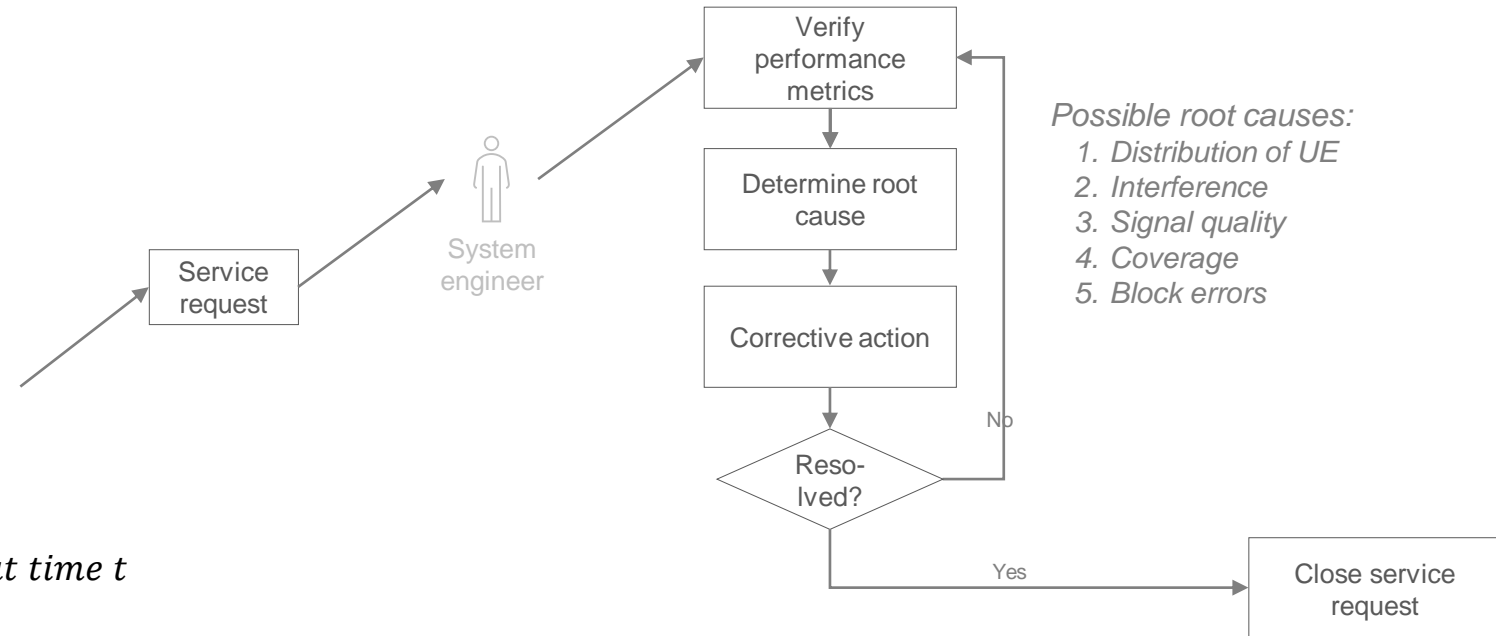
AN OPERATIONS EXAMPLE:

Network Operating Center noticed a downward trend in Session Drop Rates – quickly, isolated to a cell in a network zone.

RECOVERING FROM HIGH SESSION DROP IN A CELL

$$D_t^i = \begin{cases} c < x \\ c \geq x \end{cases}$$

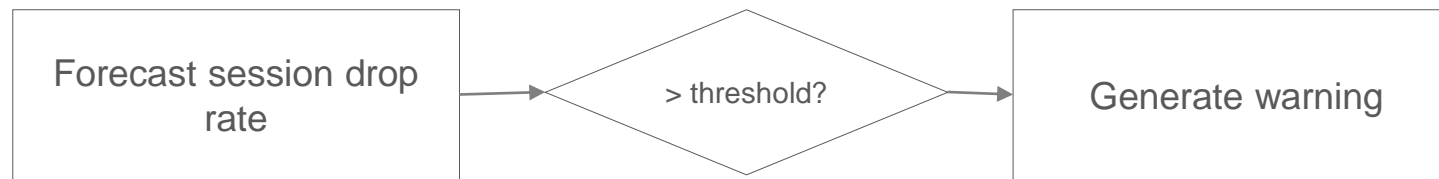
D_t^i Session drop rate for cell i at time t
 x threshold for session drop



- Labor intensive manual process takes days to weeks to fine tune a cell
- Not scalable as complexity and density of cells grow

INTELLIGENT AUTOMATION: VISIBILITY INTO FUTURE

Forecast possibility of increased session drop for each cell



RNN based timeseries forecasting

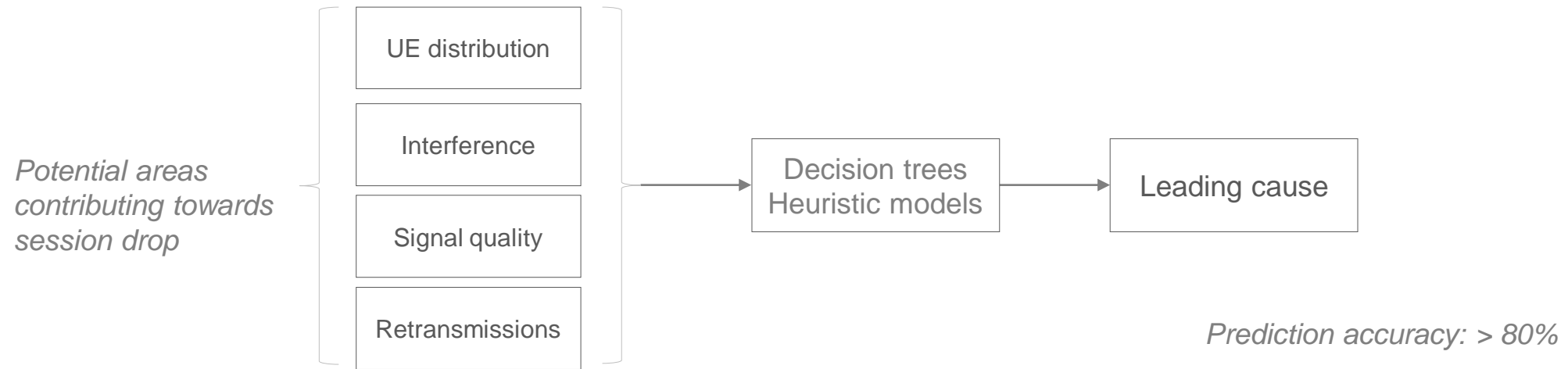
- LSTM
- CNN
- LSTM with attention mechanism

Prediction accuracy: > 70%

*The theory of strategic decision-making centers around **anticipation of future events**, taking majors to either benefit from the change, or mitigate risk. Prolific leaders envision future like no other driving strategy.*

INTELLIGENT AUTOMATION: ROOT CAUSE ANALYSIS

Determine plausible cause of session drop



- Causal data pattern analysis related to fault
- Further validates authenticity of the warning
- Prescribe warning with a leading cause

INTELLIGENT AUTOMATION: ACTION

Automated action

*Decision model
select best action possible*



- Action executed thru control API prevents a future situations from happening
- Consult human expertise when actions selection does not have a definitive choice

INTELLIGENT AUTOMATION BUILDING BLOCKS

FORECASTING



Predicts trends and value of a feature ahead of time with a high degree of accuracy

ROOT CAUSE



Investigates plausible areas of fault, narrowing down reasoning behind the issue

ACTION



Course correction allows removal of anticipated problems before they actually occur

CONCLUSION

Intelligent Automation Apps

Enables rapid automation of optimization of networks

Human knowledge integration improves engagement and examinability

Rapid development, training data, biased-learning paths, limited explorations

Delivery and Operationalization

Packaging and orchestration

Research and Development

Research to operationalization

Questions ?

**A NEW PARADIGM |
NEW THINKING |
RAPID APPLICATION DELIVERY |
INTELLIGENT AUTOMATION**



Cross-Functional Teams



INTELLIGENT RADIO NETWORK



Parallel
WIRELESS

REIMAGINE YOUR NETWORK. REIMAGINE YOUR ECONOMICS.