



加速数智化转型 赋能高质量运维

Accelerate Digital & Intelligent Transformation
Enable High-Quality O&M

中国移动 李慧镝
China Mobile Li Huidi

2020回顾

Achievements in 2020

390,000

5 million

Largest

2100

36 hours

5G基站
5G Base Stations

基站总数
Base Stations

5G SA 网络(云化、虚拟化、集中化)
5G SA Network (Cloudification, Virtualized, Centralized)

垂直行业示范项目
Demonstration Projects In Vertical Industries

率先开通雷火双神山5G基站
Work In Building 5G Base Stations For Leishenshan and Huoshenshan Hospitals

上珠峰
Mount Everest



进海港
Harbor

下深矿
Mining



经济社会数字化转型 数字蓝海大有所为

Digital Transformation in Economy and Society Gives Full Play to Digital Blue Ocean



经济社会数字化转型加速

Faster Digital Transformation in Economy and Society

2025

数字经济规模
Scale of digital economy

65 万亿
trillion

信息服务业规模
Scale of information service

20 万亿
trillion

新一代信息网络
Next-Generation Information Network

连接场景
泛在化
Ubiquitous connectivity

部署形态
软件化
Software-based deployment

运维方式
智能化
Intelligent O&M



新技术 新标准 助力网络能力演进

New Technologies & Standards Propel Network Capability Evolution



5G



核心网
Core network



IP网
IP network



传输网
Transport network

行业场景

Industrial scenarios

高容量场景

Large-capacity scenarios

空-天-地一体化

Space-air-ground integrated network

容器化

Containerized

云原生

Cloud-native

微服务

Microservices

IPv6

SRv6

一跳入云

One hop to cloud

光网络、SPN

Optical network, SPN

超大带宽

Ultra-high bandwidth

超低时延

Ultra-low latency

面对质量成本双重压力 亟需运维数智化转型

Dual Pressure From Quality and Cost Drives Digital and Intelligent Transformation of O&M



网络规模最大

Largest network scale



结构最复杂

Most complex structure

设备厂商最多

Largest number of device vendors



59,000

运维人员

O&M engineers



140 billion

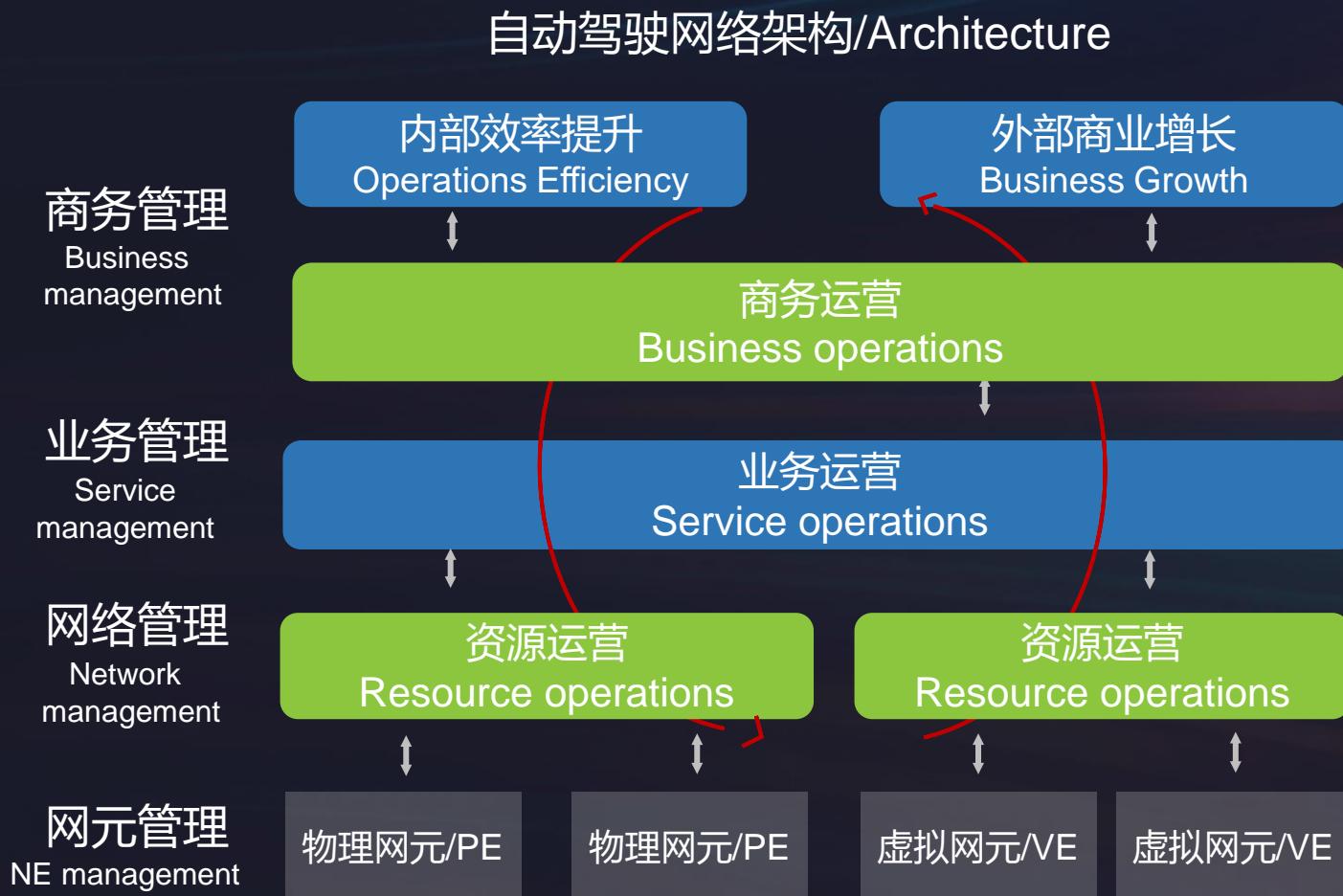
年运维费用

annual O&M expense



自动驾驶网络理念成为行业共识

Autonomous Networks Has Become Industry Consensus



自动化 智能化 加速网络体验升级

Automation and Intelligentization Accelerate Network Experience Improvement





数智结合赋能网络运维

Enable Network O&M by Combining Big Data and Artificial Intelligence



网络大数据
Network big data



AI人工智能算法
AI algorithm



资源数据
Resource data



告警数据
Alarm data



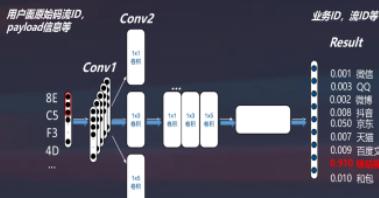
性能数据
Performance data



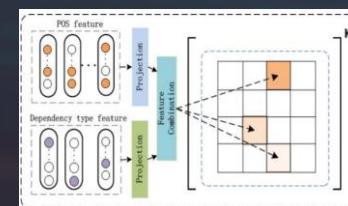
投诉数据
Complaint data



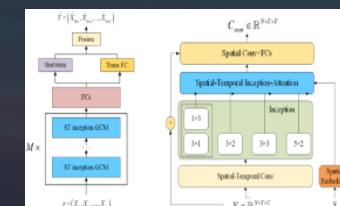
DPI数据
DPI data



感知智能
Intelligent sensing



诊断智能
Intelligent diagnosis



预测智能
Intelligent prediction



天线智能优化 显著改善速率

Intelligent Antenna Optimization Significantly Improves the Download Rate

问题 / Problems

- 1万多种天线参数组合，人工经验难优化。
- 用户分布动态变化，需同步关联优化多小区，传统统计分析方式难以快速找出最佳方案
- Combination of more than 10,000 antenna parameters, which are difficult to be optimized based on manual experience.
- When user distribution changes, multiple neighborhoods of the relating gNodeBs need to be optimized synchronously. Traditional statistical analysis methods cannot find the optimal solution quickly.

解决方案 / Solution

- 根据历史趋势，提前预判业务变化
- 粒子群优化算法，快速找到最优波束参数组合，自动下发参数配置
- Predict business changes based on historical trends.
- The PSO algorithm quickly locates the optimal beam parameter combination and automatically delivers parameter configurations.

应用效果 / Effect



室外下载速率提升13%

Outdoor download rate increased by 13%

室内下载速率提升30%

Indoor download rate increased by 30%

显著提升5G信号强度、速率和用户感知

Significantly improves 5G signal strength, rate and user experience



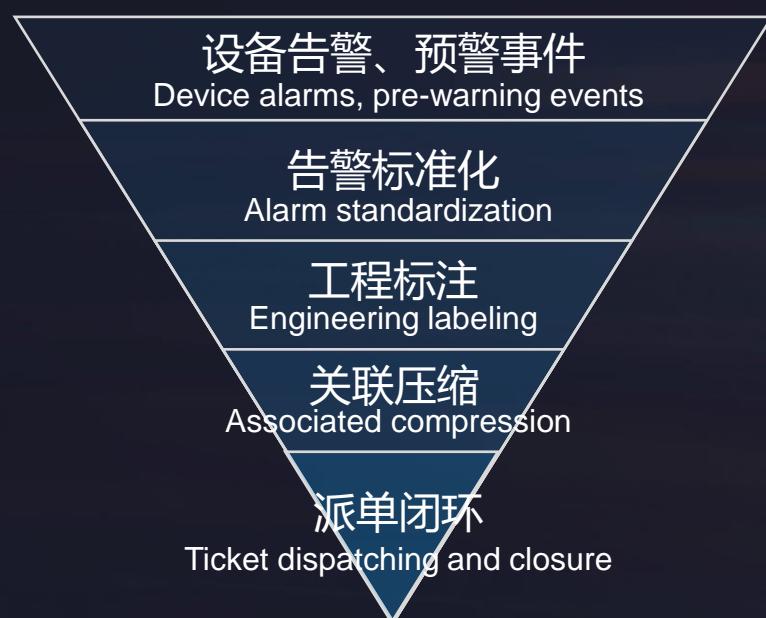
自动化、智能化的“135”故障管理框架

Automated and Intelligent “1-3-5” Fault Management

1个故障闭环管理体系

1 closed-loop fault management system

全网日告警：1亿条
Daily alarms: 100 million



3个告警知识规则库

3 types of rule-based knowledge library

- 自动化规则：标准化规则、关联规则、派单规则
Automated rules: Standardization rules, association rules, Ticket dispatch rules
- 智能化模型：采用关联规则算法Apriori 提升告警关联比例
Intelligent model: Use association rule learning algorithm to improve the alarm correlation ratio

5个核心能力

5 core capabilities

- 丰富多样的开放能力
Diversified Openness
- 可配置可开发的编排能力
Configure and Develop orchestration
- 告警质量监控能力
Alarm quality monitoring
- 告警风暴处理能力
Alarm Storm Handling
- 智能运维能力
Intelligent O&M

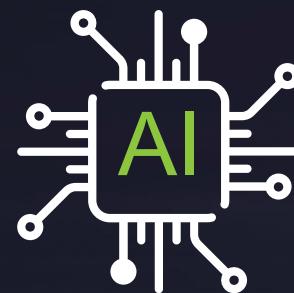


构建智慧运维能力 加强产业协同发展

Build Smart O&M Capabilities, Enhance Collaborative Industry Development

数智技术驱动

Driven by digital and intelligent technologies



自动化&智能化
Automation & Intelligentization

大数据&人工智能
Big Data & AI

运维模式转型

O&M mode transformation



运维集中化
Centralized O&M

研运一体化
Integrated R&D and O&M

产业协同发展

Collaborative industry development



构建生态合作体系
Build an ecological cooperation system

构建行业赋能平台
Build an industrial empowering platform

构建新型运维服务模式
Build a new O&M service model

4G改变生活 5G改变社会

4G changes life 5G changes society

