

QoS OF TRIPLE PLAY SERVICES OVER LTE NETWORK

- **RELEVANT FOR** MOBILE OPERATOR'S NEEDS
- **RELEVANT FOR** LTE-WIFI ROUTER
- **RELEVANT FOR** VOICE OVER WI-FI (VoWi-Fi)

ENSURING QoS OF TRIPLE PLAY SERVICES OVER LTE NETWORK

ABSTRACT

TELECOMS COMPETE FOR THEIR MARKET SHARE AND TO ACHIEVE THAT, THEY TRY TO REACH AS MANY POTENTIAL SUBSCRIBERS AS POSSIBLE. THIS IS INITIALLY DONE VIA XDSL OR FIBER NETWORKS. NOWADAY **MOBILE NETWORKS CAN BE USED FOR DELIVERY OF TRIPLE-PLAY SERVICES** AS WELL. THE **QUALITY OF RECEPTION OF MOBILE SIGNALS** IS CRUCIAL IN ORDER TO **PROVIDE REQUIRED QoS**. IN RURAL AREAS THIS CAN BE **ACHIEVED BY ISKRA OUTDOOR DIRECTIONAL ANTENNAS**.



CHALLENGE

ENSURING HIGH SUBSCRIBER PENETRATION IN CITIES AND URBAN AREAS FIRST, IS LOGICAL DUE TO THE HIGH DENSITY OF POPULATION AND CONSEQUENTLY THE NUMBER OF POTENTIAL SUBSCRIBERS. THIS IS USUALLY DONE IN **FIRST PHASE BY MEANS OF DSL OR OPTICAL ACCESS NETWORKS**.

ESTABLISHING **DSL OR FIBER NETWORKS** IS OFTEN **NOT RATIONAL**, ECONOMICALLY JUSTIFIABLE OR IS DIFFICULT TO PROVIDE. IN SUCH CASES, TRIPLE PLAY SERVICES, USUALLY IN RURAL SETTLEMENTS MAY HAVE TO BE ENSURED THE OTHER WAY, BY RECEIVING THEM OVER MOBILE (CELL) NETWORKS. BY MEANS OF NEW **LTE TECHNOLOGIES**, **MOBILE NETWORKS HAVE BECOME CAPABLE OPTION** TO DELIVER OPERATOR'S TRIPLE PLAY SERVICES TO SUBSCRIBERS.

TRIPLE PLAY SERVICES, ESPECIALLY VOICE (E.G TELEPHONY, VOWIFI) AND **VIDEO** (IPTV, VOD, OTT) REQUIRE **STABLE HIGH SPEED DATA TRANSMISSION IN ANY CONDITION** (GEOGRAPHICAL, MICROLOCATION, WEATHER). IN CASE THESE FACTORS ARE NOT ADDRESSED, THIS MAY RESULT IN LOW QUALITY OF PROVIDED SERVICE AND CONSEQUENTLY IN CUSTOMER'S DISSATISFACTION.

FROM OPERATOR'S PERSPECTIVE, NEGATIVE CONSEQUENCES MAY OCCURE:

- **HIGHER COST OF REMOTE CUSTOMER SUPPORT**
- **HIGHER COST OF ON SITE SUPPORT**
- **CHURN - TERMINATION OF SUBSCRIPTIONS**
- **BAD REPUTATION**

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SOLUTION

LTE SIGNAL IS OFTEN STRONG AND STABLE ENOUGH IN ORDER TO ASSURE TELEPHONY/DATA SERVICE.

THE PROBLEM USUALLY OCCURS AT RECEPTION OF LTE SIGNALS CARRYING HIGH SPEED DATA JUST BY INDOOR ANTENNAS (E.G. MOBILE PHONE, LTE REPEATER, LTE-WIFI ROUTER), ESPECIALLY IN THE FOLLOWING CONDITIONS:

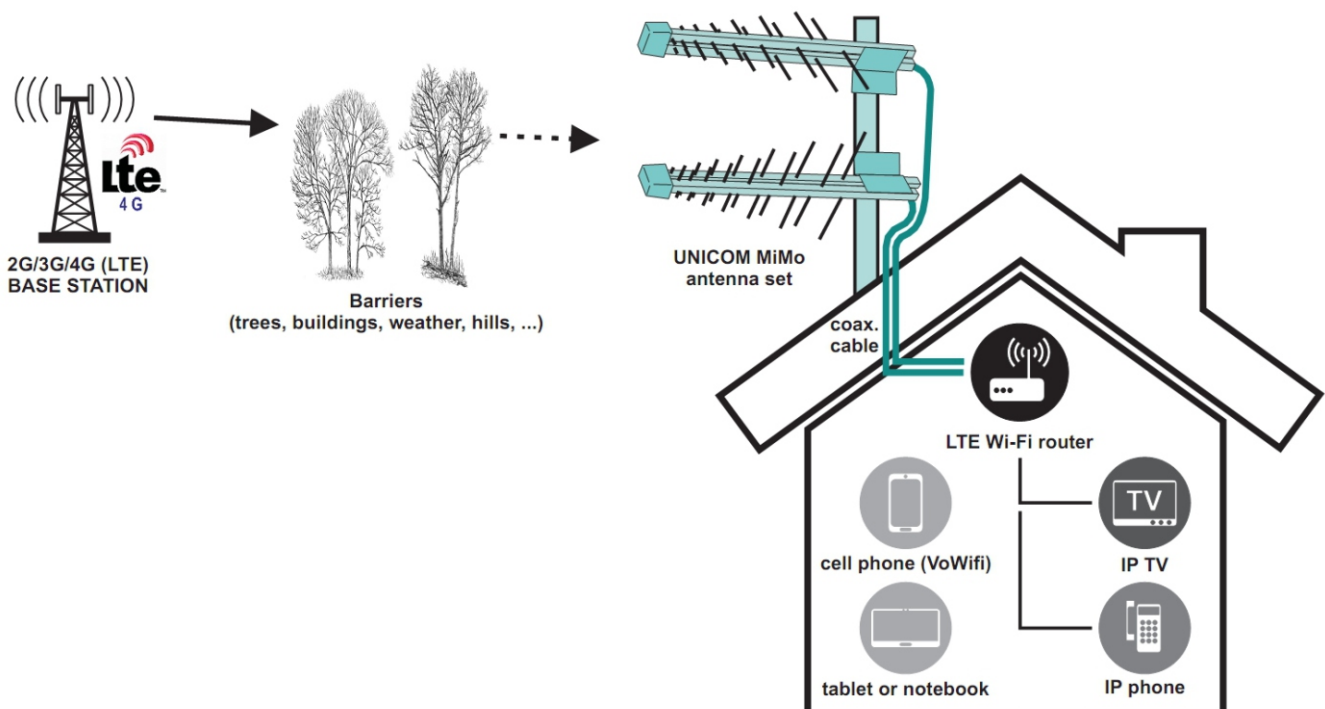
- LONG DISTANCE BETWEEN BASE STATION AND SUBSCRIBER
- BARRIERS BETWEEN BASE STATION AND SUBSCRIBER (TREES, BUILDINGS, HILLS)
- BASEMENTS OR OTHER CLOSED PREMISES
- LARGE BUILDINGS

ISKRA OFFERS SIMPLE SOLUTION TO ATTACK THIS CHALLENGE. WE PRODUCE DIRECTIONAL OUTDOOR PROFESSIONAL ANTENNAS, DEVELOPED ESPECIALLY FOR TRANSMISSION OF LTE SIGNALS.

FOR MOBILE OPERATOR'S NEEDS

THE MOST **ATTRACTIVE IS ISKRA UNICOM LINE**, WHICH PROVIDES GOOD RECEPTION OVER THE WHOLE LTE FREQUENCY RANGE. UNICOM PRODUCT LINE ALREADY INCLUDES MODELS COVERING LTE-700 BAND.

ANTENNA IS MOUNTED ON THE ROOF OR OUTER WALL OF THE BUILDING AND DIRECTED TOWARD MOBILE OPERATOR'S BASE STATION. **BY MEANS OF ANTENNA'S HIGH GAIN, STRONG LTE SIGNAL IS ACQUIRED AND LED TO INTERNAL LTE-WI-FI ROUTER VIA COAX CABLE ENDED BY SMA CONNECTOR.**



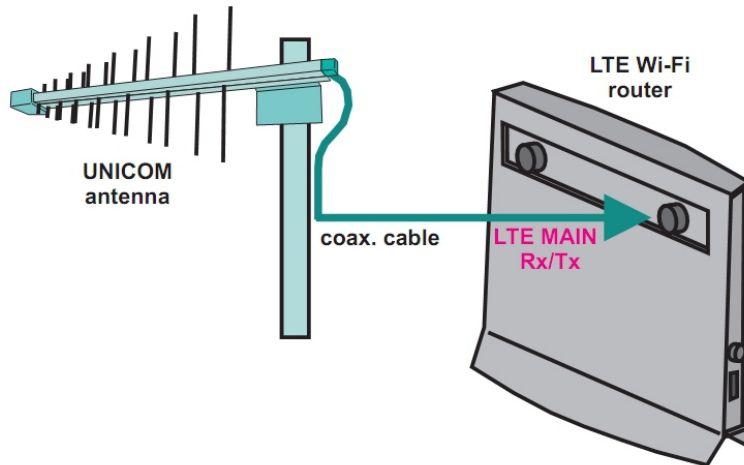
PICTURE 2: RECEPTION OF LTE SIGNALS FOR DELIVERY OF TRIPLE PLAY SERVICES

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AN LTE-WIFI ROUTER USUALLY PROVIDES:

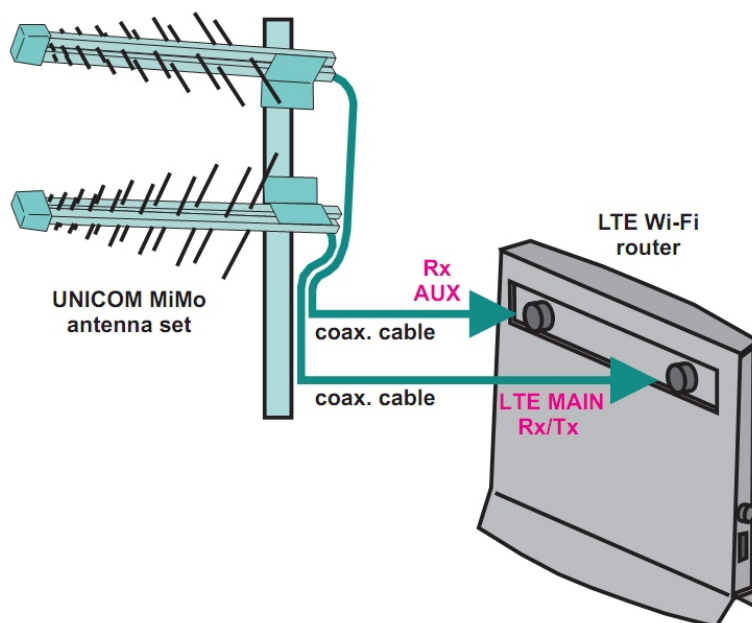
- SINGLE ANTENNA CONNECTIVITY OR
- DUAL ANTENNA CONNECTIVITY.

THE FIRST VARIANT IS ACCEPTABLE ON SITES WHERE **GOOD OUTDOOR SIGNAL** IS AVAILABLE AND NOT SO HIGH DATA SPEEDS ARE REQUIRED.



PICTURE 3: SINGLE ANTENNA APPLICATION

THE SECOND VARIANT SHOULD BE USED ON SITES WHERE **OUTDOOR LTE SIGNAL IS WEAK AND HIGH SPEED DATA RATES MUST BE CARRIED**. FOR SUCH CASES, WE DEVELOPED ANTENNA SYSTEM THAT TAKES ADVANTAGE OF SO-CALLED MIMO EFFECT. IT INCLUDES A SET OF TWO UNICOM ANTENNAS DECLINED FOR 45 DEGREES (X-POLARISATION).



PICTURE 4: DUAL ANTENNA APPLICATION

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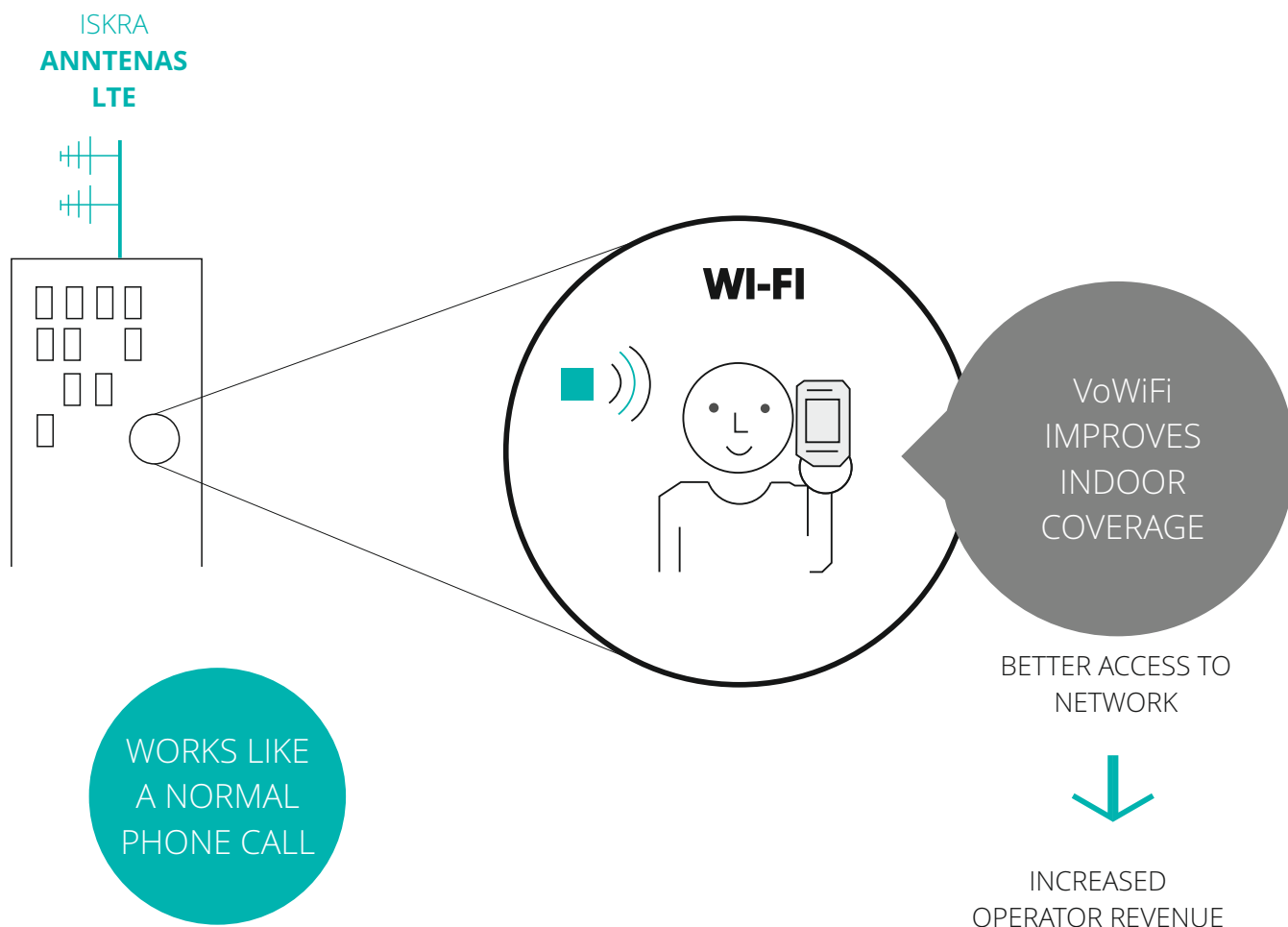
VOICE OVER WI-FI = VoWi-Fi

OPERATORS HAVE BEEN RECENTLY INTRODUCING THE “**VOICE OVER WI-FI**” FUNCTIONALITY IN THEIR MOBILE NETWORKS. IT ENABLES MOBILE USERS TO BE REACHED VIA THEIR MOBILE NUMBER OVER WI-FI SIGNAL.

THIS WIDENS THE USAGE OF MENTIONED TECHNICAL SOLUTIONS ALSO FOR THE CASES/SITES WHERE THE MOBILE **SIGNAL IS NOT STRONG ENOUGH TO PROVIDE SIMPLE VOICE CALLS. UP TO NOW, ONLY QUITE COMPLEX SOLUTION WITH GSM REPEATER WAS AVAILABLE.**

USING ISKRA DIRECTIONAL ANTENNAS AND LTE-WIFI ROUTER, THE OPERATOR CAN ASSURE COMPLETE RANGE OF SERVICES, INCLUDING VOICE CALL.

VoWi-Fi EXPERIENCE



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REFERENCE – TELEKOM SLOVENIJE

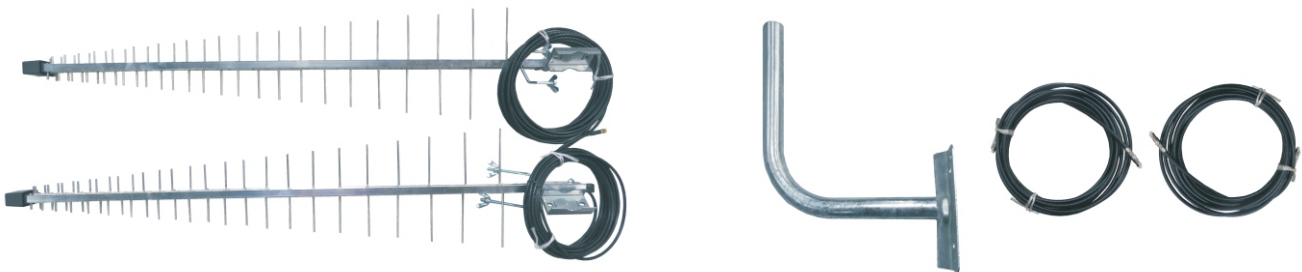
ISKRA D.D. IS VERY PROUD TO BE ALREADY ACTIVE IN THIS SEGMENT OF ANTENNAS IN COOPERATION WITH TELEKOM SLOVENIJE IN REGION OF SLOVENIA.

TELEKOM SLOVENIJE AS THE LARGEST PROVIDER OF TRIPLE PLAY SERVICES IN SLOVENIA, HAS RECOGNIZED THE NEED FOR ENSURING THEIR SERVICES IN RURAL AREAS OVER MOBILE NETWORK. THEY DECIDED TO INCLUDE ISKRA ANTENNA SET IN NEW TRIPLE PLAY SUBSCRIBER PACKAGES. IN THIS WAY THEY HAVE SOLVED (POTENTIAL) ISSUES OF BAD SIGNAL RECEPTION AND CONSEQUENTLY LOW QoS OF THEIR SERVICES.

COOPERATION BETWEEN THESE COMPANIES HAS BECOME EVEN MORE RELEVANT AFTER SOME OF THE LARGEST COMMERCIAL SLOVENIAN TV PROGRAM PROVIDERS HAVE DECIDED TO QUIT TERRESTRIAL BROADCASTING (DVB-T).

BASIC INFORMATION ABOUT MOBILE SIGNAL COVERAGE IS AVAILABLE TO THEIR SALES TEAM. UNFORTUNATELY, THEY DO NOT KNOW THE INFLUENCE OF MICRO LOCATION CONDITIONS (BUILDINGS, TREES, WEATHER). FOR THAT REASON, THEY AUTOMATICALLY INCLUDE OUTDOOR ANTENNA SET TO THE SUBSCRIBER PACKAGE FOR THE SUBSCRIBERS WHERE SIGNAL QUALITY JUST COULD BE A PROBLEM.

A NEW SUBSCRIBER OF TELEKOM SLOVENIJE, WHO WILL RECEIVE TRIPLE PLAY SERVICES OVER LTE, GETS WELCOME PACKAGE. IT INCLUDES ISKRA P-56 MIMO ANTENNA SET, 2X10M OF CABLE WITH APPROPRIATE CONNECTORS AND WALL ANTENNA MAST. OPTIONALLY, THE SUBSCRIBER CAN GET A COAX CABLE EXTENSIONS. IN THIS WAY, THE COMPANY HAS FOUND A SIMPLE SOLUTION TO TROUBLESHOOT THE PROBLEM OF BAD SIGNAL RECEPTION AT ANY MICRO LOCATION IN THE REGION OF SLOVENIA.



PICTURE 5: EXAMPLE OF ISKRA PACKAGE FOR TELCO OPERATOR

SUMMARY

INCLUDING OUTDOOR ANTENNA SET INTO NEW SUBSCRIBER PACKAGE IS SIMPLE AND EFFECTIVE SOLUTION FOR:

- **AVOIDING QoS ISSUES**
- **WIDENING THE RANGE OF TRIPLE PLAY SERVICE COVERAGE**



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