Frequency management and spectrum monitoring during the EURO-2012 in Ukraine
• From 8 June to 1 July 2012, the Union of European Football Associations (UEFA) staged the final tournament of its 14th European Football Championship (EURO 2012) in Poland and Ukraine

• Sixteen national teams competed in a total of 31 matches, which were broadcast live to more than 200 territories around the world, enabling several billion television viewers to share the excitement with over 1.4 million people in the stadiums.
ITU role

- Major events like EURO-2012 are mainly characterized by a variety of radio applications and a substantial number of radio equipment aggregated within a limited area, that requires the adequate spectrum planning, licensing, spectrum monitoring, inspection of radio stations and processing of radio interferences.

- ITU developed a guidance for Administrations on spectrum management and monitoring during major events.
ITU-R defined the following important aspects of spectrum management activities in terms of the major events preparation:

- organization team
- coordination with other organizations
- frequency planning
- licensing
- fees collection
- labelling
- interference investigation
- logistics
- radiocommunication equipment for spectrum management and monitoring staff
- appearance in public

Activities have to be carried out BEFORE, DURING and AFTER the major events.
• UCRF started to prepare for EURO 2012 more than two years before the event

• Order of the National Commission for Communications Regulation of Ukraine of 25.12.2009

• 26-30.04.2010 we visited the Austrian Telecommunication Authority and learned how Austria and Switzerland had cooperated for EURO 2008

✓ UCRF main tasks
✓ UCRF working team
✓ Contacts with UEFA and the Office of Electronic Communications of Poland (UKE)
Since December 2010 a number of meetings between UCRF, UKE and UEFA were arranged

UCRF and UKE exchanged information about frequency use, operation and import authorization, licensing fees

UEFA requirements:

- application process timing
- downloadable forms in English
- reasonable fees
- 1 month assignment period
- temporary import
- UCRF and UKE presence at the stadia
- testing and labeling the radio equipment
- UCRF and UKE hotline number
- Common action plan
Specific tasks at a stage of long-term preparation to EURO 2012

- obtaining the preliminary information on required spectrum, potential frequency users and radio technologies
- simplifying an application procedure for temporary permissions on import and operation of radio electronic facilities (REFs)
- initial spectrum occupancy measurements (verification of existing use, elimination of illegal use, checking the availability of frequencies)
- EMC analysis, frequency planning and refarming to meet an estimated spectrum demand and protect existing local frequency users
- defining the stadium area to be controlled as well as required spectrum monitoring manpower and technical facilities
- implementation of dedicated UCRF web-page devoted to EURO 2012
- creation of special e-mail address for receiving the applications and queries from the spectrum users
- coordination of authorization procedure with UKE and UEFA (starting time and deadline, forms of applications, tariffs etc)
- providing the information to broadcasters and journalists about frequency usage and authorization in Ukraine
- development of proposals for cellular mobile operators to ensure the respective level of QoS during the event.
Actions before EURO 2012

- **Final tournament draw** (Kyiv, 2 December 2011) provided a good chance for testing:
  - workability of frequency authorization process
  - efficiency of radio monitoring
  - technical check and labeling of radio equipment
  - Resulted in improvement of application procedure and gave practical knowledge to UCRF and UKE staffs on performing their tasks during UEFA events
• UCRF and UKE ensured that everybody is aware of the regulations on frequency use by providing the information to broadcasters and journalists about frequency usage and authorization in Ukraine and Poland during two World Broadcasting Meetings, organized by UEFA in June and December 2011.
Detailed information related to frequency usage in Ukraine during EURO 2012 was available on dedicated web-page of the UCRF:

- frequency assignment procedure,
- downloadable application forms (doc, pdf) and filled samples
- tariffs
- rules of REFs’ operation in Ukraine
- information about import procedure
- REFs’ labeling and admission to the stadia
- monitoring and interference elimination
- contacts
Actions before EURO 2012

- A simplified procedure for temporary frequency assignment for foreign users during EURO 2012 had been approved by the National Commission for Communications Regulation of Ukraine on 1 December 2011.
- Authorized broadcasters, journalists and partners could import the radio equipment for EURO 2012 without permission from the UCRF.
- Frequency authorization stage started on 5 January 2012.
- Deadline for frequency application - 15 April 2012.
- Only 45 percent of applications were submitted prior to the official deadline (a month and a half before the tournament).
Specific tasks at an authorization stage and preparation just before the event

- processing the applications, EMC analysis and frequency assignment
- on-site spectrum monitoring
  (ensuring the availability of assigned frequencies, frequency occupancy measurements, suppressing unauthorized usage)
- labeling and technical check of radio equipment of local services before event
  (police, ambulance, fire-fighting, security etc labeled their equipment 15, 10 and 5 days before the first match)
- completing logistic arrangements
  (accreditation of main and reserve staff, vehicles position in compounds, staff desks position at the stadia, electricity supply, internet access, ensuring communication with UEFA and between monitoring team members, staff schedule and uniform)
- supplementing the UCRF dedicated web-page with updated or additional information
• In total, UCRF received 3773 applications from 83 companies (including 1163 portable radio stations, 920 TETRA terminals, 229 base stations of UHF communication, 1199 radio microphones, 134 SNG stations)

• Based on “first come first served” principle, foreign users obtained 3569 permissions for operation of their radio equipment during EURO 2012 in Ukraine

• All applications, permissions and related correspondence with the UCRF staff were ensured both in English and Ukrainian languages

• Consideration of applications – no more than 1 month
The main complexity of authorization stage may be characterized by:

- **55%** of applications were submitted after the deadline (UCRF received applications from **20** companies for more than **400** REFs after start of EURO 2012)
- due to operation of some equipment in both countries users intended to use the same frequencies in Poland and Ukraine despite variety of spectrum availability and differences of national frequency usage plans
- numerous corrections to applications were required after check for completeness and validity
- in most cases applications had to be corrected after initial consideration by frequency managers and proposing alternative frequencies
- mistakes in paying the invoices (outstanding bank commissions, use of incorrect data for bank transfer) led to delays in issuance of permissions
Activities just before and during EURO 2012

During the tournament the UCRF staff was working at all stadiums in days before and during matches of EURO 2012 in Ukraine, ensuring:

- radio frequency monitoring on assigned frequencies
- determination of unlicensed emissions
- detection and elimination of sources of harmful interference
- technical check and labeling of radio equipment for foreign users
- rapid consideration of late applications (above 400 REFs were applied for authorization after start of event)
- QoS measurements in relation to major cellular mobile operators in Kyiv
UEFA used the frequency stickers as a tool that helped to identify which radio equipment was authorized for the use at stadia and broadcasting compound in match days.

All accredited users had to address the UCRF staff to label their equipment with country specific or stadium specific stickers in advance.

**Conditions of labeling:**
- presence of the UCRF permission
- technical characteristics in compliance with notified to the UCRF
In media center and broadcasting compound of each stadium there were UCRF points for issuing the stickers and checking the technical characteristics of radio equipment on compliance with authorized ones.
Noting that intervals between matches ranged from 4 to 7 days, 3 stages were defined for monitoring activities at each stadium:

- 2 days before match (MD-2)
- 1 day before match (MD-1)
- Match Day (MD)

**Timing:**
- MD-2 – from 10:00 to 17:00
- MD-1 – from 10:00 to 18:00
- MD – from 11:00 to 21:00 and from 12:00 to 24:00 (for match start at 19:00 or 21:45)

**Features:**
- MD-2 – test switching on of UHF base stations and SNG stations
- MD-1 – test switching on of data communication equipment and wireless cameras
At 4 stadiums the UCRF spectrum monitoring system was ensured by using 8 fixed and 18 mobile monitoring stations and walking groups equipped with 13 handheld direction finders.

- Fixed monitoring station (media tribune)
- Mobile monitoring station (broadcasting compound)
- Walking monitoring group (pitch exit)
- Special point of technical control (broadcasting compound)
Donbass Arena Stadium in Donetsk

MMS 1, 2 - Mobile monitoring station,

MMP 3 - Mobile monitoring point, walking group

SPTC 1, 2 - Special point of technical control (in Media Center and Broadcasting Compound)
• Fixed monitoring station
• Mobile monitoring station
• Walking monitoring group
• Special point of technical control

1 – Broadcasting Compound
2 – Media Center
3 – Walking group
4 – Technical control
1) Mobile monitoring station - (group №1) – outer perimeter of stadium

2) Semi-fixed monitoring station (group № 2) – inside stadium’s cup

3) Walking monitoring group (group № 3) – inside stadium (top of cup)

4) Mobile monitoring station (group № 4) – outer perimeter of stadium

5) Mobile point of technical control № 1 (group № 5) – Media Center

6) Point of technical control № 2 (group № 6) – between outer and inside perimeters of stadium
Fixed monitoring station at Olympic Stadium in Kyiv
In case of interference, the walking monitoring groups were involved in determination and elimination of interference source within stadium or broadcasting compound.
UCRF monitoring team at Olympic Stadium in Kyiv
• When using so many radio facilities in a small area, it is not possible to avoid harmful interference completely
• Summarizing the interference cases, they were caused by:
  • operation of radio equipment with wrong or exceeding parameters with respect to authorized ones,
  • illegal operation,
  • faulty equipment programming,
  • damaged cables
• Checking the stadia in the period of their construction was also important – UCRF radio monitoring specialists helped to avoid the potential interference due to unshielded cable laying
• More than **9000** radio electronic facilities were monitored at preparatory stage and during tournament in Ukraine

• UCRF space radio monitoring station performed a control of **59** earth satellite stations, operated by broadcasters within stadia and compounds areas

• Effective monitoring activity before event – **87** sources of interference eliminated on assigned frequencies

• In the period of EURO 2012 there were only **11** interference cases and **7** illegal operation cases, detected in Ukraine

• All cases required immediate response, so they were settled within the shortest possible time, which on practice varied from several minutes to two hours
The UCRF telephone hotline was in operation 2 weeks before EURO 2012 and during full period of event, including weekends, providing all necessary assistance and clarification to spectrum users

- 9:00 - 17:00 from Monday till Thursday
- 9:00 - 16:00 on Fridays
- 9:00 - 22:00 on MD-1
- 9:00 - 23:00 on MD
- For overall period a number of queries to hotline exceeded 700 calls
Specific tasks after event

Shortly after EURO 2012 the following **post-event works** were performed by the UCRF:

- staff and equipment removal from all stadiums
- finalizing the settlement of accounts by last minute applicants
- summarizing the statistics for frequency authorization, radio monitoring and interference cases
- overview of overall activity on debriefing meeting
Conclusions

• In the case of such major events, like EURO 2012, having a numerous number of radio applications and equipment, operated at the same time within a limited area, it is possible to minimize interference by doing the most of works before event

• ITU-R Report SM.2257 contains the necessary guidelines and practical experience of other administrations, which may be essential for performing the proper planning and ensuring the successful activity of frequency management authority before, during and after the major events

• UCRF activities on frequency use planning, simplification of authorization procedure, technical check of radio equipment, spectrum monitoring, efficient interference elimination and close cooperation with UEFA ensured non-interference operation of radio-electronic facilities for EURO-2012
UEFA: “Only with the great commitment of experienced partners like the Ukrainian State Centre of Radio Frequencies, we were able to make this challenging UEFA EURO 2012™ a fantastic event leaving that we hope to be significant legacy in both host countries.”
Thank you for your attention! Any questions?

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