



Fixed Satellite Service PLAN (Appendix 30B)

(Technical Examination Exercise)

ITU-R/SSD

Space Notification and Plans Division



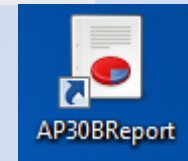
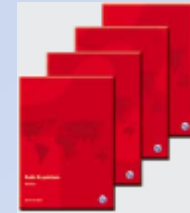
Technical Examination Exercise

Concept

BR Software used for Technical Examinations

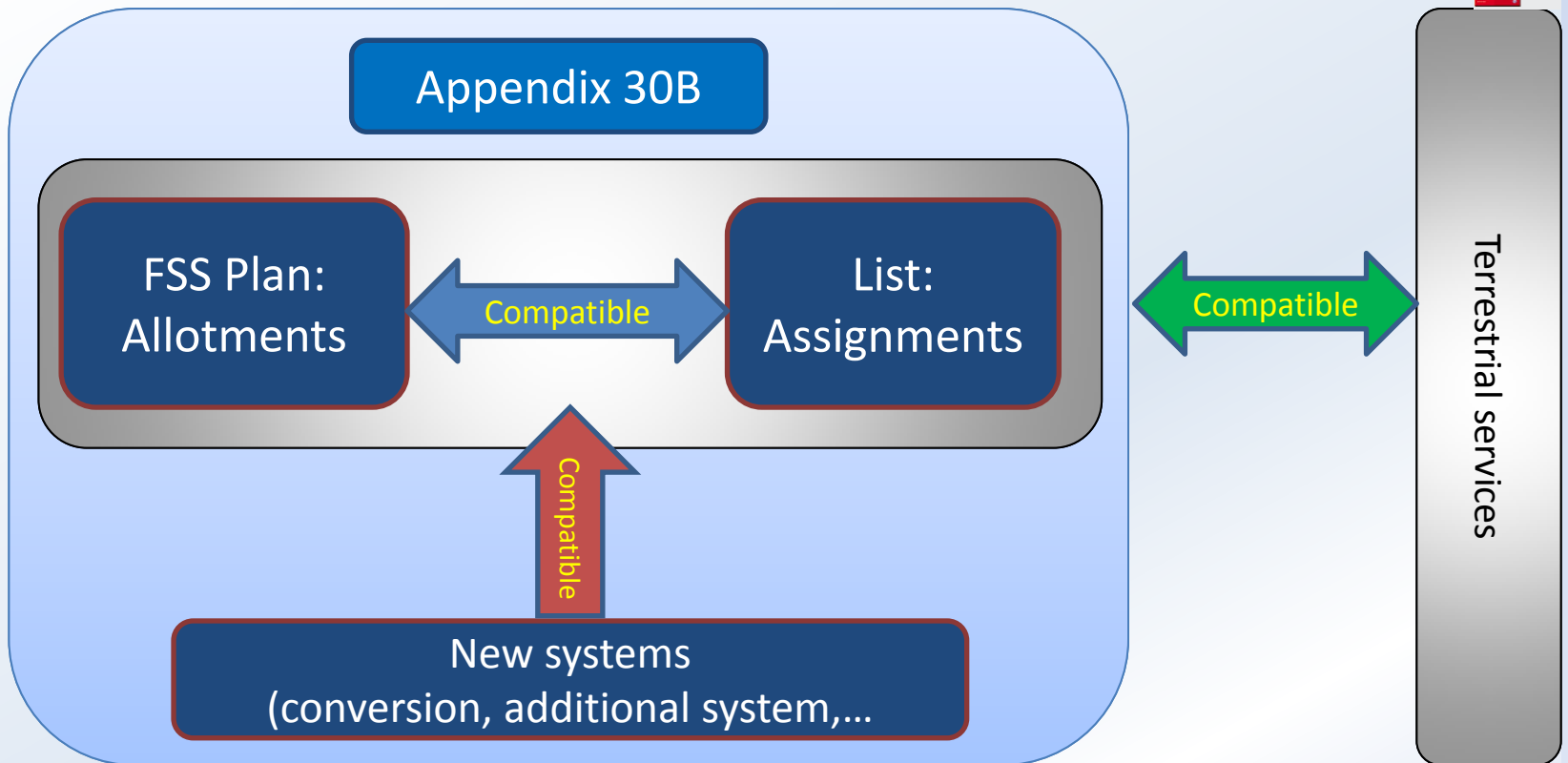
Technical Examination and View Results

Questions?



Technical Examination Exercise

- **Concept**



Technical Examination Exercise

- **Concept (cont.)**



Categories of Protection Criteria

HARD Limits

(If exceeded → the finding is unfavorable and the assignment is returned back to the notifying administration)

Coordination Triggers

(Agreements of affected administrations are required)

- To preserve current and future use of FSS and terrestrial services
- To protect existing allotments / assignments in the Plan / List

Technical Examination Exercise

- **Concept (cont.)**



PFD HARD limits

If exceeded, the submission is **unfavorable** and **returned back** to the notifying administration.

Article 21 of Radio Regulations

(to protect existing and future use of **terrestrial services**)

- Downlink PFD hard limit on the surface of the Earth

Annex 3 of Appendix 30B

(to preserve current and future use of **Fixed Satellite Service**)

- Downlink PFD hard limit on any portion of the surface of the Earth
- Uplink PFD hard limit towards any location in the GSO-satellite orbit located **beyond the coordination arc**

Technical Examination Exercise

- **Concept (cont.)**



Article 21 of Radio Regulations

(to protect existing and future use of **terrestrial services**)

Frequency band	Service	Limit in dB(W/m ²) for angles of arrival (d) above the horizontal plane			Reference bandwidth
		0°-5°	5°-25°	25°-90°	
4 500-4 800 MHz 5 670-5 725 MHz (Nos. 5.453 and 5.455) 7 250-7 850 MHz	Fixed-satellite (space-to-Earth) Meteorological-satellite (space-to-Earth) Mobile-satellite Space research	-152	$-152 + 0.5(d - 5)$	-142	4 kHz
10.7-11.7 GHz	Fixed-satellite (space-to-Earth) (geostationary-satellite orbit)	-150	$-150 + 0.5(d - 5)$	-140	4 kHz

Technical Examination Exercise

- **Concept (cont.)**

Annex 3 of Appendix 30B

(to preserve current and future use of [Fixed Satellite Service](#))



Downlink PFD **hard limit**

on any portion of the surface of the Earth

-127.5dB (W/(m² · MHz)) in 4GHz

-114.0dB (W/(m² · MHz)) in 10/11GHz



Uplink PFD **hard limit**

towards any location in the geostationary-satellite orbit located

beyond the coordination arc

-140.0dB (W/(m² · MHz)) beyond 10° in 6GHz

-133.0dB (W/(m² · MHz)) beyond 9° in 13GHz



Technical Examination Exercise

- **Concept (cont.)**



Coordination Triggers

If exceeded, the agreement of affected administrations is required.

Annex 4 of Appendix 30B

(to reach compatibility between Allotments / List and new systems within coordination arc)

- Uplink single-entry C/I (at test points)
- Downlink single-entry C/I (at test points and **grid points**)
- Aggregate C/I (at test points)

Service area coverage examination (§6.6 of AP30B)

(to identify the service area of the new FSS system)

- Identify the administrations whose territory is partially or wholly included in the service area of the network under examination

Technical Examination Exercise

- **Concept (cont.)**



Compatibility within coordination arc (Annex 4 of AP30B)

Agreement is required when at least one of the following three conditions is not satisfied



Uplink single-entry $C/I \geq 30\text{dB}$, or $(C/N)_{\text{up}} + 9\text{dB}$,
or accepted value

Downlink single-entry $C/I \geq 26.65\text{dB}$ or $(C/N)_{\text{down}} + 11.65\text{dB}$
or accepted value (test points and **grid points**)

Over all aggregate $C/I \geq 21\text{dB}$ or $(C/N)_{\text{total}} + 7\text{dB}$
or accepted value

Notes: Computation precision is 0.05dB for all

Tolerance is 0.25dB for aggregate C/I criteria of assignments not stemming from conversion (beyond the envelop characteristics of the initial allotment)

Technical Examination Exercise

- **Concept (cont.)**



Grid points for downlink examination (see note 19 of Annex 4 to AP 30B)

Introduced by WRC-07 to properly protect the service area of allotments / assignments from shaped beams whose antenna diagrams contain a number of “holes” towards certain specific downlink test points.

The grid points are **evenly generated inside and on the border of the service areas** of the interfering networks.

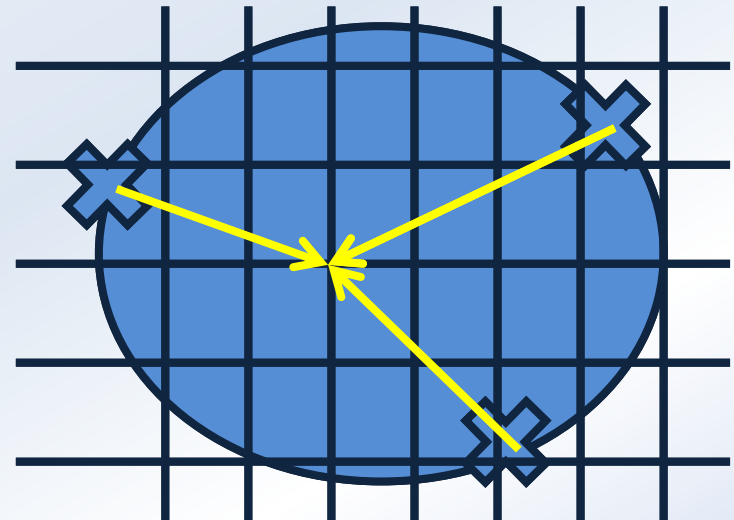
The reference value at a grid point **is interpolated** from the reference values on the test points.

$$V_{Eg} = \frac{\sum_{h=1}^{Nt} R_{Th} \times (d_{Th})^{-2}}{\sum_{h=1}^{Nt} (d_{Th})^{-2}}$$

Note: If the value $(R_{Th} - ((C/N)_{d,Th} - (C/N)_{d,Eg}))$ is lower than R_{Th} , then $(R_{Th} - ((C/N)_{d,Th} - (C/N)_{d,Eg}))$ shall be used in the equation instead of R_{Th} ,

where: $(C/N)_{d,Th}$: the downlink C/N value at test point Th ;

$(C/N)_{d,Eg}$: the downlink C/N value at test point Eg .





Technical Examination Exercise

- **Concept (end)**





Criteria in “Other provisions”

- Earth station **e.i.r.p** limits for angle from horizon $\leq 5^\circ$ (§21.8- 21.12 of RR);
- Earth station **elevation angle** must be $> 3^\circ$ (§21.14 of RR);
- Downlink **PFD Limits** in Table 21-4 of RR (§21.16 -21.17 of RR);
- Uplink **e.i.r.p** limits towards GSO orbit for 3° or more off the main-lobe axis (§22.26-22.31 and §22.37 of RR);
- Longitude tolerance ($\pm 0.1^\circ$) (§22.8 of RR);
- Pointing accuracy (§22.19 of RR)

Technical Examination Exercise

- BR Software used for Technical Examinations**

AP30B Provisions	Criteria	Software	Publications
§6.3 a)	“Other provisions”	GIBC/PFD	AP30B/A6A/ Special Section (§6.7 of AP30B)
§6.3 b)	Annex 3 of AP30B	GIBC/Appendix 30B 	
§6.4	Annex 4 of AP30B		
§6.6	(service area)		
§6.19 a)	(service area)	GIBC/Appendix 30B	AP30B/A6B/ Special Section (§6.23 or §6.25 of AP30B)
§6.19 b)	“Other provisions”	GIBC/PFD 	
§6.19 c)	Annex 3 of AP30B	GIBC/Appendix 30B	
§6.21	Annex 4 of AP30B		
§6.22			



GIBC - Graphical Interface for Batch Calculations on PC

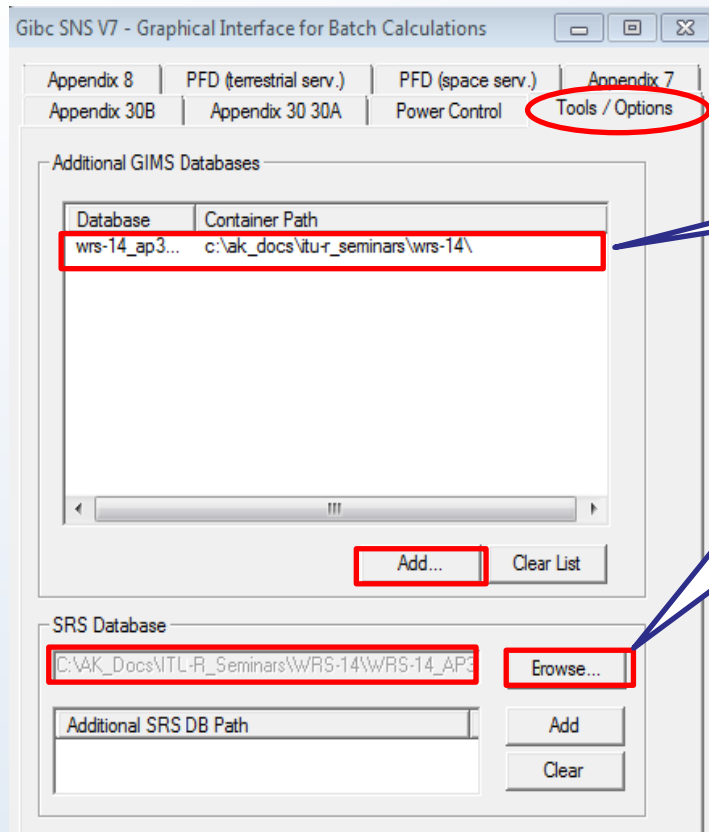
(Note: GIBC requires having GIMS package installed.)



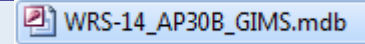
AP30BReport - Viewer of AP30B Reports

Technical Examination Exercise

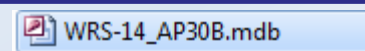
- **Technical Examination and View Results (Step 1)**



1. Connect your GIMS Database



2. Connect your AP30B Database



Using GIMS and AP30B databases

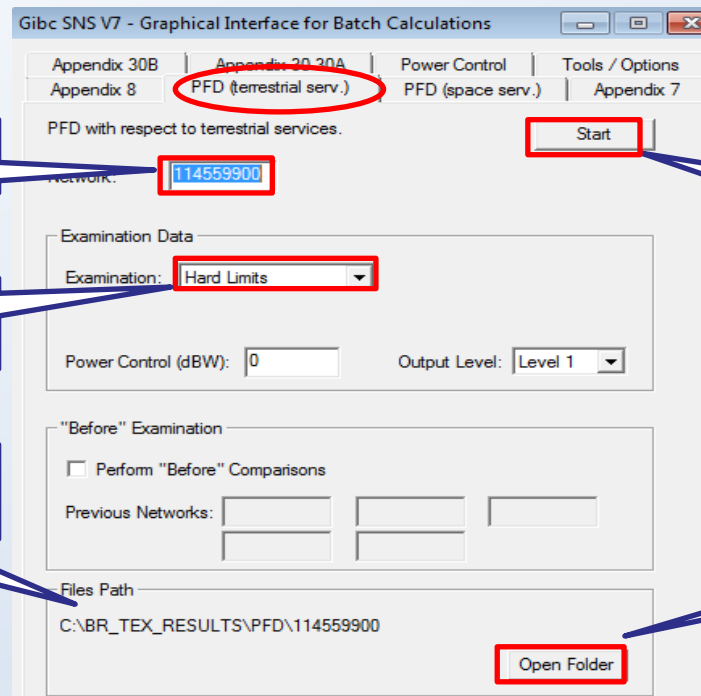


Technical Examination Exercise

- **Technical Examination and View Results (Step 2 (1/2))**



**Downlink PFD hard limit on the surface of the Earth
(Article 21 of Radio Regulations)**



1. Network ID (114559900)

2. Type of Examination
"Hard Limits"

4. Location of Results File

3. Push "Start"

5. Open Folder to see
Examination Results





Technical Examination Exercise

- Technical Examination and View Results (Step 2 (2/2))



**Downlink PFD hard limit on the surface of the Earth
(Article 21 of Radio Regulations)**

```
FNDGS.TXT - Notepad
File Edit Format View Help
11455990ORRC 00000000300000000000000000000YNSBPFD A-
11455990ORRK 00000000400000000000000000000YNSBPFD A-
11455990OTFC 00000000100000000000000000000YNSBPFD A-
11455990O TEC 00000000500000000000000000000YNSBPFD N- X/21.16
11455990OTEK 00000000200000000000000000000YNSBPFD A-
11455990OTEK 00000000600000000000000000000YNSBPFD A-
```

PFD Limit is exceeded!



```
PFD.LST - Notepad
File Edit Format View Help
START OF JOB SNSBPFD 24.11.14 16.10.27 VERSION 7.7.0.1
AXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX
$
114559900 H 01N
EARTH STATION E.I.R.P. VALUES BE CHECKED AGAINST $22.26 LIMIT (ONLY FOR AP30B NETWORKS) AND ARTICLE 21 LIMITS
SPACE STATION PFD VALUES WILL BE CHECKED AGAINST HARD LIMITS ONLY
$
SNS PFD EXAMINATION REQUESTED BY : DATE: 24/11/14 16:10:27 PAGE: 0001
SUI WRS-14 AP30B 65.00E 0.10 0.10 00.10 17.11.14 P 114.559900
EC 30.0 DB 114.559900
EC EK ER 300000 KHZ 000.000005
4650.00000 M 300000 KHZ 300M 0.0 DBW -40.0 DBW/HZ -40.0 DBW/HZ (NBW) N- 0001
(5) RR 21.16 FIXED-SATELLITE REF. BW 0.004MHZ
ALL WORLD 045E06 67N33 RUS 26.0 -141.1 7.1 -148.2 N-
```

See details



Check error message in MSG.LST !

Technical Examination Exercise

• Technical Examination and View Results (Step 3 (1/2))



Annex 3 of Appendix 30B

Gibco SNS V7 - Graphical Interface for Batch Calculations

Appendix 8 | PFD (terrestrial serv.) | PFD (space serv.) | Appendix 7
Appendix 30B | Appendix 30 30A | Power Control | Tools / Options

Network ID: 114559900

Cancel Start

Messages Filter
 Progress
 Warnings
 Extended

Analysis Type
 Annex 3 PFD
 SA Coverage
 Annex 4 C/I
PFD (Art.21)

C/I Options
 Detailed Report
 Date Limit
Generate Grid

Message
PROGR> Downlink PFD analysis completed
PROGR> Starting uplink PFD analysis
PROGR> Starting analysis of grp 3
PROGR> Starting analysis of grp 4
PROGR> Uplink PFD analysis completed
PROGR> Closing SPS database connection
PROGR> Closing GIMS database connections
PROGR> Starting to export results to output database
PROGR> Export results to output database completed
Appendix 30B PFD calculation finished. 16:19:49. Results File is C:\BR_TE

Calculation Output
C:\BR_TEX_RESULTS\AP30B\114559900\141124_161944\
Open Folder Open Database Open Log File Ap30BReport

Version
3.3.0.0 Appendix 30B

1. Network ID (114559900)

2. Type of Examination
"Annex 3 PFD"

4. Location of Results File

3. Push "Start"

5. Run AP30BReport



Technical Examination Exercise

- Technical Examination and View Results (Step 3 (2/2))



Annex 3 of Appendix 30B

The screenshot shows the AP30BReport application window. The 'Main' tab is selected, showing 'Annex 3 - PFD'. The 'Query options' section has 'only favourable' selected. The 'Run Query' button is highlighted. A table of results is displayed below, with the 5th row highlighted in blue and the 6th row highlighted in red. Annotations with callout boxes point to various elements: '1. Open Annex 3 - PDF Results' points to the 'Annex 3 - PFD' tab; '2. Set the View Criteria' points to the 'Query options' section; '3. Run Query of Results' points to the 'Run Query' button; and 'See details' points to the 5th row of the results table.

Beam Name	E/R	Frequency Band	Group ID	Finding	PFD Excess	PFD Limit	Worst GSO Pos.
EC	E	6/4	1	A-	-4.567	-127.5	
EK	E	13/11	2	A-	-3.667	-114	
RC	R	6/4	3	A-	-9.585	-140	55
RC	R	6/4	3	A-	-9.52	-140	75
RK	R	13/11	4	A-	-5.442	-133	56
RK	R	13/11	4	A-	-5.381	-133	74
EC	E	6/4	5	N-	15.433	-127.5	
EK	E	13/11	6	A-	-3.667	-114	

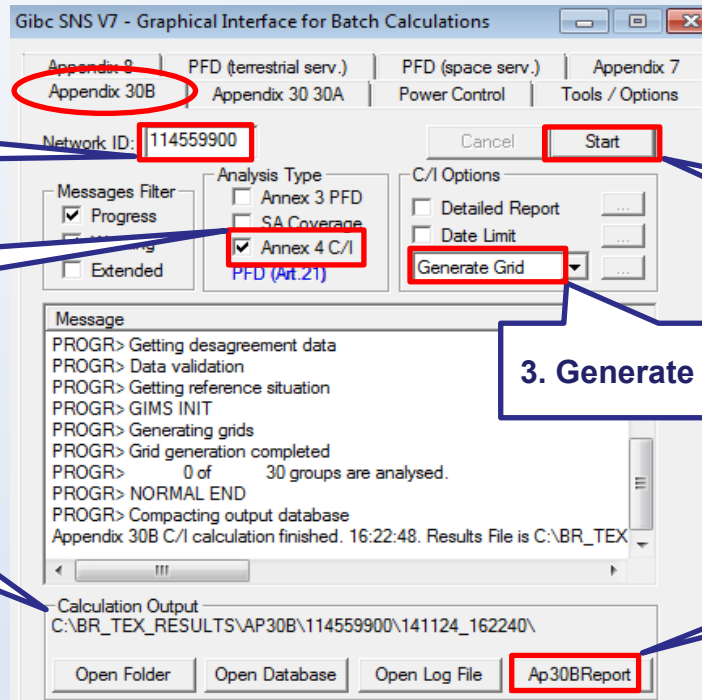


Technical Examination Exercise

- Technical Examination and View Results (Step 4 (1/5))



Annex 4 of Appendix 30B



1. Network ID (114559900)

2. Type of Examination
"Annex 4 C/I"

5. Location of Results File

3. Generate Grid

4. Push "Start"

6. Run AP30BReport



Technical Examination Exercise

- Technical Examination and View Results (Step 4 (2/5))



Annex 4 of Appendix 30B

The screenshot shows the AP30BReport application window. The 'Main' menu is open, and 'Annex 4 - C/I' is selected. The 'Report Type' dropdown is set to 'Affected networks summary'. The 'Run Query' button is highlighted, and a message indicates 'Found 19 results in 0 ms'. Below the button is a table of results.

1. Open Annex 4 – C/I

2. Affected network summary

3. Run Query of Results

See details

Orbital Position	Admin.	Ntwk. Org.	Notiçe ID	Satellite Name	Network Status	C/I Degradation	Annex 4 Subsection	Frequency Band
67.11	EGY		90558073	EGY00000	Allotment	29.87	2.2	6/4
67.11	EGY		90558073	EGY00000	Allotment	7.395	2.3	13/10-11
67.11	EGY		90558073	EGY00000	Allotment	13.04	2.2	13/10-11
67.11	EGY		90558073	EGY00000	Allotment	24.22	2.3	6/4
65	ISR		109559008	AMS-30B-65E	Pending	26.021	2.3	13/10-11
65	ISR		109559008	AMS-30B-65E	Pending	32.666	2.2	13/10-11
65	ISR		109559008	AMS-30B-65E	Pending	25.138	2.1	13/10-11
64.4	BLR		110559004	BTS-1-30B	Pending	24.589	2.3	13/10-11
64.4	BLR		110559004	BTS-1-30B	Pending	6.927	2.1	6/4





Technical Examination Exercise

- Technical Examination and View Results (Step 4 (3/5))



Annex 4 of Appendix 30B

The screenshot shows the AP30BReport application window. The 'Menu' dropdown is open, highlighting 'Annex 4 - C/I'. The 'Analysis Parameters' section shows the input database path, start and end times, and user information. The 'Report Type' list includes 'Affected networks summary', 'Technical examination summary', 'C/I values at test and/or grid points', and 'Reference situation'. The 'Run Query' button is highlighted, and a status bar indicates 'Found 7 results in 90 ms'. A table of results is displayed at the bottom, with columns for Orbital Position, Admin., Ntwk. Org., Notice ID, Satellite Name, Network Status, Frequency Band, SE Down TP Degradation, SE Down GP Degradation, SE Up Degradation, and AG Degradation.

Orbital Position	Admin.	Ntwk. Org.	Notice ID	Satellite Name	Network Status	Frequency Band	SE Down TP Degradation	SE Down GP Degradation	SE Up Degradation	AG Degradation
64.4	BLR		110559004	BTS-1-30B	Pending	13/10-11	30.235	30.047	0.169	24.589
64.4	BLR		110559004	BTS-1-30B	Pending	6/4	48.544	48.402	6.927	42.894
67.11	EGY		90558073	EGY00000	Allotment	13/10-11	13.04	12.975		7.395
67.11	EGY		90558073	EGY00000	Allotment	6/4	29.87	29.748		24.22
65	ISR		109559008	AMS-30B-65E	Pending	13/10-11	32.666	32.55	25.138	26.021
65	ISR		110559021	AMS-30B-C-65E	Pending	6/4	49.889	49.144	21.804	33.898
64	PNG		112559041	NEW DAWN FSS-4	Pending	13/10-11	11.705	11.717	12.611	11.156

4. Technical exam summary

5. Run Query of Results

See details



Technical Examination Exercise

- Technical Examination and View Results (Step 4 (4/5))



Annex 4 of Appendix 30B

6. C/I values at test and/or grid points

7. Filter Value (optional)

8. Run Query of Results

See details

Admin.	Notice ID	Satellite Name	Orbital Position	Frequency Band	Grp. Id. Aff. Up	Grp. Id. Aff. Dn	Grp. Id. Inf. Up	Grp. Id. Inf. Dn	Inf. Notice Id	Inf. Sat. Name	S	Type	Point Long
BLR	110559004	BTS-1-30B	64.4	6/4	25	0	3	0	114559900	WRS-14 AP30B	P	P	23.2
BLR	110559004	BTS-1-30B	64.4	6/4	25	0	3	0	114559900	WRS-14 AP30B	P	P	23.52
BLR	110559004	BTS-1-30B	64.4	6/4	25	0	3	0	114559900	WRS-14 AP30B	P	P	23.61
BLR	110559004	BTS-1-30B	64.4	6/4	25	0	3	0	114559900	WRS-14 AP30B	P	P	25.8
BLR	110559004	BTS-1-30B	64.4	6/4	25	0	3	0	114559900	WRS-14 AP30B	P	P	26.64
BLR	110559004	BTS-1-30B	64.4	6/4	25	0	3	0	114559900	WRS-14 AP30B	P	P	28.13
BLR	110559004	BTS-1-30B	64.4	6/4	25	0	3	0	114559900	WRS-14 AP30B	P	P	30.27
BLR	110559004	BTS-1-30B	64.4	6/4	25	0	3	0	114559900	WRS-14 AP30B	P	P	30.55



Technical Examination Exercise

- Technical Examination and View Results (Step 4 (5/5))



Annex 4 of Appendix 30B

The screenshot shows the AP30BReport software interface. The 'Annex 4 - C/I' window is active, displaying a 'Filter Field' section with the following values:

- Admin.:
- Notice ID:
- Frequency Band: 13/11
- Annex 4 Subsection:
- Grp. Id. Aff. Up.:
- Grp. Id. Aff. Dn.:

The 'Available Filter Values' section is empty. Below the filter fields, a 'Run Query' button is visible, with a status message 'Found 232 results in 150 ms'. A table of results is displayed below the query button, with the first row highlighted in blue. A large blue arrow points from the 'Frequency Band' filter field to the first row of the table.

Admin.	Notice ID	Satellite Name	Orbital Position	Frequency Band	Grp. Id. Aff. Up	Grp. Id. Aff. Dn	Point Longitude	Point Latitude	New C/I Reference	C/I Referen	Annex 4 Subsectio
BLR	110559004	BTS-1-30B	64.4	13/11	26	24	23.2	52.26	-3.028	23.242	2.3
BLR	110559004	BTS-1-30B	64.4	13/11	26	24	23.52	53.95	-1.631	23.842	2.3
BLR	110559004	BTS-1-30B	64.4	13/11	26	24	23.61	51.53	-3.589	22.967	2.3
BLR	110559004	BTS-1-30B	64.4	13/11	26	24	25.8	54.86	-1.106	24.091	2.3
BLR	110559004	BTS-1-30B	64.4	13/11	26	24	26.64	55.69	-1.637	23.894	2.3
BLR	110559004	BTS-1-30B	64.4	13/11	26	24	28.13	56.16	-2.577	23.688	2.3
BLR	110559004	BTS-1-30B	64.4	13/11	26	24	30.27	55.87	-3.546	23.368	2.3
BLR	110559004	BTS-1-30B	64.4	13/11	26	24	30.55	51.27	-2.238	23.515	2.3

Annotations on the screenshot include:

- 9. Reference situation (points to the 'Reference situation' option in the report type list)
- 10. Filter Value (optional) (points to the 'Filter Value' field)
- 11. Run Query of Results (points to the 'Run Query' button)
- See details (points to the first row of the results table)



Technical Examination Exercise

• Technical Examination and View Results (Step 5 (1/2))



Service area coverage examination

Gibc SNS V7 - Graphical Interface for Batch Calculations

Appendix 8 PFD (terrestrial serv.) PFD (space serv.) Appendix 7
Appendix 30B Appendix 30 30A Power Control Tools / Options

Network ID: 114559900

Messages Filter
 Progress
 Warning
 Extended

Analysis Type
 Annex 3 PFD
 SA Coverage
 Annex 4 C/I
PFD (Art.21)

C/I Options
 Detailed Report
 Date Limit
Generate Grid

Cancel Start

Message
Calling Appendix 30B Calculation at 16:25:43...
PROGR> IDWM Data Files Date: 20130613
PROGR> IDWM Data Files Path: C:\BR_SOFT\IDWM
PROGR> Using SPS database: C:\AK_Docs\ITU-R_Seminars\WRS-14\WRS
PROGR> Using GIMS database: wrs-14_ap30b_gims on c:\ak_docs\itu-r_sem
PROGR> Checking database version
PROGR> Creating output database
PROGR> Starting coverage analysis
Appendix 30B SA Coverage finished. 16:25:59. Results File is C:\BR_TEX_RE:

Calculation Output
C:\BR_TEX_RESULTS\AP30B\114559900\141124_162543\
Open Folder Open Database Open Log File Ap30BReport

1. Network ID (114559900)

2. Type of Examination
"SA Coverage"

4. Location of Results File

3. Push "Start"

5. Run AP30BReport



Technical Examination Exercise

- Technical Examination and View Results (Step 5 (2/2))



Service area coverage examination

The screenshot shows the AP30BReport application window. The 'Main' tab is selected, and 'Service Area Coverage' is highlighted in the left-hand menu. The 'Analysis Parameters' section shows the input database path, start and end times, and user information. A 'Run Query' button is highlighted with a red box, and a callout box points to it with the text '2. Run Query of Results'. Another callout box points to the 'Service Area Coverage' menu item with the text '1. Open "SA Coverage"'. A third callout box points to the 'Run Query' button with the text 'See details'. Below the 'Run Query' button, a table displays the results of the query. The table has columns for 'Beam Name', 'E/R', and 'SA Number'. The first row shows 'EC', 'E', and '1'. A large red box highlights the list of geographical areas in the 'SA Number' column, which includes a long list of country codes and administrative regions.

Beam Name	E/R	SA Number	Notifying administration/Geographical area
EC	E	1	AFG ; AFS ; AGL ; ALB ; ALG ; F/AMS ; AND ; ARM ; ARS ; XZZ/ATA ; AUS ; AUT ; AZE ; BDI ; BEL ; BEN ; BFA ; BGD ; BHR ; BIH ; BLR ; BOT ; BRM ; BRU ; BTN ; BUL ; CAF ; CBG ; CHN ; AUS/CHR ; CLN ; CME ; COD ; COG ; COM ; F/CRO ; CTI ; CVA ; CYP ; CZE ; D ; G/DGA ; DJI ; DNK ; E ; EGY ; ERI ; EST ; ETH ; F ; FIN ; GAB ; GEO ; GHA ; GNE ; GRC ; CHN/HKG ; AUS/HMD ; HNG ; HOL ; HRV ; I ; AUS/ICO ; IND ; INS ; IRN ; IRQ ; ISR ; J ; JOR ; KAZ ; KEN ; F/KER ; KGZ ; KOR ; KRE ; KWT ; LAO ; LBN ; LBY ; LJE ; LSO ; LTU ; LUX ; LVA ; CHN/MAC ; MAU ; MCO ; MDA ; MDG ; MKD ; MLA ; MLD ; MLI ; MLT ; MNE ; MNG ; MOZ ; MRC ; AFS/MRN ; MTN ; MWI ; F/MYT ; NGR ; NIG ; NMB ; NPL ; OMA ; PAK ; PHL ; PLW ; POL ; QAT ; F/REU ; MAU/ROD ; ROU ; RRW ; RUS ; S ; SDN ; SEY ; G/SHN ; SMR ; SNG ; SOM ; SRB ; SSD ; STP ; SUI ; SVK ; SVN ; SWZ ; SYR ; TCD ; TGO ; THA ; TJK ; TKM ; TLS ; TUN ; TUR ; TZA ; UAE ; UGA ; UKR ; UZB ; VTN ; XZZ/XBY ; XZZ/XGZ ; XZZ/XSP ; XZZ/XWB ; YEM ; ZMB ; ZWE





Fixed Satellite Service PLAN (Appendix 30B)

(Technical Examination Exercise)



Thank you... Any questions?



The Bureau has produced video presentations to assist administrations in using the GIBC software package:



<http://www.itu.int/en/ITU-R/space/plans/Pages/AP30B.aspx>

International Telecommunication Union

WORLD
RADIOCOMMUNICATION
SEMINAR 2014

GENEVA, 8-12 DECEMBER 2014

www.itu.int/go/ITU-R/WRS-14

Organised by: